THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXXXVI., No. 21. Whole No. 1,668 | NEW YORK, MONDAY, MAY 27, 1907. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. | THOMAS J. CUNNINGHAM, ELBERT P. CALLENDER. } Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

NOTICES—

Announcement, Third Annual Meeting, Iowa District Gas Association. 881

Wrinkle Department, The American Gas Institute. 881

OFFICIAL—

The American Gas Institute.—An Invitation. 881

EDITORIALS—

Briefly Told 881

The Referee's Opinion on the New York City Gas Rate Law—The Sixth Annual Meeting of the Wisconsin Gas Association—An Explanation—Current Comment.

Sixth Annual Meeting, Wisconsin Gas Association—Report of Proceedings 882

First Day, Morning Session—Report of Executive Committee—Election of New Members—Change of Meeting Time—Nominating Committee—Reports of Sec.-Treas.—Reports from Special Committees—Inaugural Address—Committee on President's Address—A Proposed Classification of Gas Coals, by Mr. H. I. Lea.

Bench Fuel Economies, by Mr. F. M. Richards 886

*The Lighting of Modern Garages and Grounds, by "Engineer". 887

*An Ancient Gasholder 888

The Rare Earths and the Incandescent Mantle, by F. Bonnet, Jr... 888

A Brief Theory of the Reduction in the Service Life of Frosted Incandescent Lamps, by Dr. A. E. Kennelly 890

*A Brazilian Gas Office Building 891

Making Gasoline from Gases 892

Flow of Steam Through Pipes and from a Given Orifice 892

SPECIAL ENGLISH CORRESPONDENCE 893

Municipal and Private Enterprise—Another Innovation from Baron von Welsbach—The Irish International Exhibition.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES 894

Extensions, Greenfield, Mass.—To Supply Gas in Thompsonville, Conn.—Cheaper Gas for Fitchburg, Mass.—Babylon (L. I.) Has No Gas—Annual Meeting, Port Huron, Mich.—Death of Mr. W. K. Callahan—A String to the Demonstrator—Personal—The Khorassan Carnival—Contract for Baltimore Firebrick Company—Ditto, for Gas Bench Construction Company—Annual Meeting, So. Jersey Company—Personal—Haverhill's Authorities are Restrained—Cheaper Gas for Oshkosh, Wis.—Betterments at Augusta, Ga.—Personal—Suburban Gas Company's Bonds—And Other Items.

The Market for Gas Securities 896

[NOTICE.]

Announcement of the Third Annual Meeting, Iowa District Gas Association.

The Third Annual Meeting of the Iowa District Gas Association will be held in Cedar Rapids, Ia., June 12th, 13th and 14th.

Headquarters and place of meeting will be at the Montrose Hotel. The Hotel offers rates on the American plan of $2.50 per day up, and European plan $1 per day up. Best accommodations are always secured by reservations made in advance.

In addition to the regular set papers, the Council has decided upon the following topics for general discussion as being of broad interest to all members of the Association. The subjects will not be specifically assigned, but the Chairman will call upon the various members for their ideas and experiences in any or all of the subjects:

"Removal and Disposal of Tar."
"Purification."
"Prepaid Meters."
"Removing Meters versus Shutting-Off Gas with or without Lock Cocks."
"Minimum Charges."

The following papers will be presented:

"Experiences in Operating Water Gas Machines," by Mr. L. H. Reuping, Sioux City, Ia.
"Attitude of Gas Companies Toward the Public," by Mr. Jansen Haines, Des Moines, Ia.
"The Organization of Gas Companies in Towns of Less Than 10,000 Inhabitants," by Mr. Geo. H. Waring, Omaha, Neb.
"High Pressure Transmission," by Mr. L. H. Lawlor, Waterloo, Ia.
"Arc Lamp Maintenance: Methods and Results," by Mr. J. C. Grey, Des Moines, Ia.
"New Business," by Mr. A. W. Zahm, Mason City, Ia.
"Accidents and Damages," by Mr. G. M. Averill, Cedar Rapids, Ia.
"Standard Methods in Service: Meter and Appliance Fittings."—Short Topic, by Mr. G. I. Vincent, Des Moines, Ia.

The "Wrinkle Department" will be conducted by Mr. H. D. Mitchell, St. Charles, Mo.

Every gas man in Iowa, Nebraska and South Dakota is expected to attend the meeting.

G. I. VINCENT, Secy. and Treas.

[NOTICE.]

Wrinkle Department, The American Gas Institute.

To the Membership, American Gas Institute: All members of The American Gas Institute, and others interested, are requested to contribute a description of any novel device or scheme covering any feature of the gas business. Every department of every Company uses some novel stunt which would be of value to others. The object of this department is to compile such information. The value of the report depends entirely on the co-operation received. Send in your contribution at once to

MILAN R. BUMP, Editor,
60 Wall street, New York.

[OFFICIAL.]

The American Gas Institute.—An Invitation.

AMERICAN GAS INSTITUTE,
OFFICE OF SECRETARY,
NEW ALBANY, IND., May 20, 1907.

An official invitation has been received, signed by G. I. Vincent, Secretary of the Iowa District Gas Association, extending to the officers and members of the American Gas Institute an invitation to be present at the Third Annual Meeting of the Association, to be held in Cedar Rapids, Ia., June 12, 13 and 14, 1907.

JAMES W. DUNBAR, Secy.

BRIEFLY TOLD.

THE REFEREE'S OPINION ON THE NEW YORK CITY GAS RATE LAW.—While the report of Mr. Arthur H. Masten, appointed by the United States Circuit Court to take testimony in the case of the Consolidated Gas Company, of New York city, against the officials of the State and city, to have declared unjust the enforcement of the act popularly known as the "80-cent gas measure," is before the Court for confirmation or rejection, it would not seem correct to now comment upon it. The partial report was handed in early last week, and it is to be presented *pro forma* for the consideration of the Court next Saturday. This reference was written the 23d inst. It may, however, with pro-

LIBRARY OF CONGRESS
MAY 27 1907
SMITHSONIAN DEPOSIT

priety be now said that the referee substantially upholds the contention of the Company in all main features, although the opinion respecting the constitutionality of the measure is not clearly set out by Mr. Masten. However, what he does say thereon is enough, we think, to lead to the belief, provided the Circuit Court accepts his findings, that the act is without the sanction of the constitution. Two points are very prominent in the findings; first, that the rate specified is not a reasonable one; second, that if a franchise may be taxed for public purposes it undoubtedly has a real value for representation in capital account. The inquiry was a record-making one, in that it was begun July 15, 1906, that 118 set sessions were had and that 7,000 pages of testimony were taken. The moral effect of the affair is really immeasurable, in that it shows that, although the ways of the higher courts are seemingly slow, order may be trusted to come out of chaotic conditions brought about by the miserable attempts of grafters of the newspaper and political sort, when the law is appealed to for justice only.

THE SIXTH ANNUAL MEETING OF THE WISCONSIN GAS ASSOCIATION.—The meeting of the Wisconsin Gas Association for this year was successfully brought off according to programme. Although the attendance was not quite up to the mark the morning of the first day, before the sessions were declared at an end the representation was up to the best estimates and hopes of the warmest supporters of the Association's objects. Mr. Corscot made an excellent presiding officer, and Secretary Hyde and the various committees certainly were able aides. The technical sessions were interesting and useful, and the business was carried out quite in the manner laid down on the programme. The officers elected were: President, Edward Daniell, Marinette; Vice-President, S. J. Glass, Milwaukee; Sec.-Treas., H. H. Hyde. Milwaukee was named as the next meeting place, and the time for holding the sessions was fixed for the dates that formerly served the Western Gas Association. The social side of the convention was much enjoyed. The most attractive number in this respect was the banquet in the house of the Milwaukee Athletic Club, which was shared in by 56. The proceedings were directed by President John Corscot and notable speeches were made by Mr. Wilmer Sieg, Guy F. Gregg, E. G. Cowdery and E. G. Pratt. The eating and the listening were punctuated by well tuned vocal and instrumental selections. The meeting was a thoroughly good one.

AN EXPLANATION.—Mr. C. E. Paige, Superintendent of the Malden and Melrose (Mass.) Gas Company, writing under date of the 21st inst., says: "We note in your issue of May 13th an account of the upsetting of a locomotive crane used by us at our works, the reason for the trouble being attributed to the strength of the wind. We think it should be stated that we made a thorough investigation of the matter and find that the trouble was in no wise due to the construction or design of the crane, but entirely to the action of the operator, who failed to put in sufficient counterweights and operated the crane with the boom set at a much smaller angle than was permissible. We are perfectly certain that if the builder's directions had been followed the accident could not have occurred."

CURRENT COMMENT.—

WE regret to have chronicle the resignation of Mr. Udolpho Snead from the Presidency of the Louisville Gas Company and of the Louisville Lighting Company, too; he will remain a Director in both corporations. He resigned simply because of the growth of the business of the Snead & Co. Iron Works, the plant of which is in Jersey City, N. J., of which concern Mr. Snead has been the executive head for several years. Mr. F. M. Sackett succeeds Mr. Snead as executive head of both Companies. His management of the Louisville Gas Company since 1899—he took hold of it at a time when internal dissensions were rife within it—and his direction of its affairs have been such as one would naturally expect from a cultured, judicial minded, honest man.

THE annual meeting of the Southwestern Electrical and Gas Association was held in San Antonio, Tex., the 14th to 16th insts. The meeting it is said was a thoroughly successful and enjoyable one, but the Society seems not to care much for publicity through the medium of the JOURNAL, seemingly preferring to permit the electrical interests to control its affairs. The outing feature was, as usual, the transactions of the Sons of Jove.

THE pooling and rearranging terms of the affairs of the gas, electric light and street railway interests of Toledo have been agreed upon. These will be submitted to the stockholders for ratification some time next month.

SIXTH ANNUAL MEETING, WISCONSIN GAS ASSOCIATION.

HELD AT HOTEL PFISTER, MILWAUKEE, WIS., MAY 15–16, 1907.

FIRST DAY—MORNING SESSION.

The meeting was called to order by the President, Mr. John Corscot, of Madison, at 11 A.M., May 15th, who said: We haven't as many as we thought here, but I presume a number will come in later on. However, we will proceed with the order of business, the first of which is the

ROLL CALL.

It is suggested by the Secretary that, owing to the small attendance, the roll call might better be put over until this afternoon. Will some one make a motion to that effect?

On motion of Mr. Wortendyke, the roll call was ordered set over to 2:30 P.M.

The reading of the minutes of the last meeting having been dispensed with by motion, the President called for the

REPORT OF THE EXECUTIVE COMMITTEE,

which the Secretary read, as follows:

Your committee begs to recommend to membership in this Association the following:

Active.

D. E. Callender, Chief Clerk, Racine (Wis.) Gas Light Company.
John Dell., Pres., Hannibal (Mo.) Gas and Electric Company.
M. J. Kinch, Supt., Green Bay (Wis.) Gas and Electric Company.
B. F. Lyons, Acting Mgr., Beloit (Wis.) Water, Gas and Electric Company.
B. L. Parker, Secy., Green Bay (Wis.) Gas and Electric Company.
M. T. Walker, Asst. Secy., Wausau (Wis.) Gas Company.
E. Branneis, gasfitter, Eau Claire, Wis.
C. E. Carter, Supt. Dis., Madison (Wis.) Gas and Electric Company.
R. C. Douglas, Mgr., Manitowoc (Wis.) Gas Light Company.
R. Young, Supt.-Treas., Sheboygan (Wis.) Gas Light Company.
W. Jones, Supt., Wis. Traction L. H. & P. Company, Appleton, Wis.
J. Williamson, Engr., Peoples Gas Light and Coke Company, Chicago, Ills.
J. B. Lindl, Mgr. New Business, Madison (Wis.) Gas and Electric Company.
H. Larson, Appliance Dept., North Shore Gas Company, Waukegan, Ills.

Associate.

August Court, Secy. and Treas., Gas Bench Construction Company, St. Louis, Mo.
A. M. Cressler, Treas., Kerr Murray Mfg. Co., Fort Wayne, Ind.
D. C. Harr, Representative, The Estate Stove Co., Hamilton, O.
C. T. Chisholm, Traveling Salesman, General Gas Light Company, Kalamazoo, Mich.
D. R. Russell, Vice-Pres., Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
R. T. Speer, Sales Agent, Western Gas Construction Company, Fort Wayne, Ind.
J. W. Simmons, Salesman, Lindsay Light Company, Chicago, Ills.

Resignations.

H. Adler, Clerk, Milwaukee (Wis.) Gas Light Company.
J. Challoner, Vice-Pres. and Treas., Berlin (Wis.) Gas Company.
T. F. Grover, Vice-Pres. and Gen. Mgr., Eastern Wisconsin Railway and Light Company, Fond du Lac, Wis.
T. C. Hendley, Pres., Beloit (Wis.) Gas Light and Coke Company.
J. S. Hendley, Mgr., Beloit (Wis.) Gas Light and Coke Company.
E. J. Sherwood, Laclede Gas Light Company, St. Louis, Mo.
G. W. Rue, Rockford, Ills.

Papers.

The following papers have been prepared for presentation at this convention:

"The Development of Gasholder Construction," by Mr. George H. Cressler.
"A Proposed Standard Classification of Coals and Oils," by Mr. Henry I. Lea.
"Bench Fuel Economics," by Mr. F. M. Richards.
"Question Box," by Mr. Ewald Haase.
"Wrinkles," by Mr. James H. Walker.

Change of Meeting Time.

Prior to this year conventions of this Association have been held on

the first Wednesday and Thursday after the 10th day of February of each year, according to the by-laws.

On account of the prevailing severe weather it is deemed advisable to set this back to some date later in the year, and inasmuch as the corresponding days of May have been left open by the consolidation of various Gas Associations it is recommended that Article 23 of the By-Laws be amended to read:

"The annual meeting of the Association shall be held on the first Wednesday and Thursday, after the 10th day of May, of each year, at such place as shall be designated at the preceding annual meeting. Special meetings and executive sessions may be called at the option of the Executive Committee."

Nominating Committee.

The following are recommended as a Nominating Committee to select officers for the ensuing year:

Mr I. F. Wortendyke, Mr. F. M. Richards, Mr. P. M. Gelatt.

JOHN CORSCOT,
EDWARD DANIELL,
EDWARD G. PRATT, } Executive Committee.

The President—Gentlemen, you have heard the report of the Committee. What is the pleasure of the convention? It is suggested that the subject matter of the report might be divided, that portion relating to the time of meeting being made a matter for separate consideration. The Chair is ready to hear any motion in reference to the matter. It occurred to me while the Secretary was reading the report of the Executive Committee that we have one member recommended as an addition to the Association who lives in St. Louis, and we may need legislation to get him in here. What is the pleasure of the convention with reference to the report of the Executive Committee?

Mr. Glass—Does the report carry with it the election of the new members there, or is a separate action necessary?

The Secretary—Yes; that carries with it the admission to membership.

Mr. Glass—I move that the portion of the report other than that relating to the time of meeting be adopted.

The President—You have heard the motion of Mr. Glass, that so much of the report as relates to the election of new members and the appointing of a Nominating Committee be adopted. Those in favor of the motion will say aye. Opposed, no. [Carried.] What is the pleasure of the convention with reference to the resolution fixing the time of meeting?

At the suggestion of Mr. Glass, that section of the report was put over for consideration until the attendance was larger.

REPORTS OF SECRETARY-TREASURER.

The Secretary and Treasurer then read the reports for the period ended May 14, 1907:

Receipts.

Cash on hand as per last report	$256.29	
Initiation fees and dues	306.00	
Advertisements in "Journal Proceedings"	200.00	
Sale of 35 chemistry handbooks	65.00	
Proceedings	25.00	
Association dinner receipts	180.00	$1,032.29

Disbursements.

Reporting 1906 meeting	$125.00	
Printing papers and "Journal of Proceedings"	284.50	
Postage	22.85	
Express	10.12	
Convention buttons	10.00	
Stenographic work	10.00	
Stationary and printing	22.00	
Publishing "Handbook on Gas Works Chemistry"	134.75	
Milwaukee Athletic Club dinner	222.85	
Secretary's salary	100.00	
Balance in hand of Treasurer	90.22	$1,032.29

Members May 1st, 1907.

	Active.	Associate.	Total.
February 1, 1906	81	38	119
Joined 1906 meeting	14	6	20
	95	44	139
Resigned	2	1	3
	93	43	136

The reports were accepted and ordered printed with the proceedings

REPORT ON PUBLICATION OF DR. HARROP'S HANDBOOK.

Secretary Hyde read the report as follows:

Pursuant to a motion of Mr. John Corscot, at the last meeting of this Association, I desire to report that the three papers prepared by Dr. H. B. Harrop, with such corrections and additions as the writer saw fit to make, were published in book form and distributed to the members of this Association gratis during October of last year.

Respectfully submitted, H. H. HYDE, Secy.

Association Library.

Desiring to start a Reference Library for the members of this Association, I wrote recently to Secretaries of the various Gas Associations for bound copies of their proceedings, and read you herewith replies from Mr. James W. Dunbar, Secretary of the Western Gas Association, and Mr. N. W. Gifford, Secretary of the New England Association of Gas Engineers:

AMERICAN GAS INSTITUTE,
NEW ALBANY, IND., May 11th, 1907.

Henry H. Hyde, Secretary, Wisconsin Gas Association: On behalf of the Western Gas Association, I present the Wisconsin Gas Association 6 volumes, containing Proceedings from the years 1887 to 1906, inclusive. Wishing your Association a successful career, I remain, yours very truiy, JAMES W. DUNBAR, Secy.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
EAST BOSTON, MASS., May 10, 1907.

Mr. Henry H. Hyde, Secretary, Wisconsin Gas Association, Racine, Wis.—I am forwarding by express 2 sets of the Proceedings of this Association, in 4 volumes each, covering the years 1897–1905, inclusive, with the compliments of the New England Association of Gas Engineers.

Yours very truly, N. W. GIFFORD, Secy.

The President—The report of the Secretary will be placed on file and printed with the Proceedings, and a vote of thanks will be extended to the officers sending the report, as outlined in the report of the Secretary. The next order of business is the

REPORTS FROM SPECIAL COMMITTEES.

I believe Mr. Glass has a report to make as Chairman of the Legislative Committee.

Mr. Glass reported as follows:

Mr. Chairman and Gentlemen: I hardly know just what kind of a report is expected from the Legislative Committee, but you are all familiar with the various bills that have been introduced, and perhaps know as much about it as I do. There were over 50 bills introduced altogether, affecting the gas interests, not including a large number of bills relating to child labor, hours of work and so on. To these latter bills we paid no particular attention, for the reason that they were being looked after by the Legislative Committee of the Merchants' and Manufacturers' Associations, who were perhaps better equipped to follow them up than we. We have been following the bills directly pertaining to the gas interests, of which as I said there were something over 50, and to date no action has been taken on 27 of those bills. One bill at present is in the hands of the Senate Committee on Cities, which has been recommended for indefinite postponement and re-referred back to the Committee. Twelve of the bills were indefinitely postponed; five have been reported for passage or recommended for passage; 3 have been passed in the Senate and 4 in the Assembly. The bills we have been looking after run as follows:

	No. of Bills.
Commission government for cities	1
Commission for public lighting	3
Condemnation proceedings	3
Contributory negligence	2
False statements	1
Forfeiture of franchises	2
Milwaukee Gas Light Company, exclusive rights	5
Milwaukee Gas Light Company, range business	2
Acquisition and operation of public utilities by municipalities	6
Ownership of public utilities	2
Establishment of public works department	1
Authorizing municipalities to fix rates	5
Smoke nuisance	1
Standards for gas	1
Stealing gas	3
Holding of stocks of subsidiary companies	1
Issue of stocks and bonds	5
Stockholders' liability	1
Use of streets for laying pipes, etc	4

	No. of Bills.
Taxation and assessments	2
Distribution of taxes	1
Trusts and combinations	1
Payment of wages	1

One bill we have not followed up. Of the 21 bills held up at the present time, and upon which no action has been taken, the greater majority you might say are being held in abeyance awaiting action on the general public utility bill, which has recently been distributed. The hearings on that bill, as you all know, commence to-day, and will continue until all have had an opportunity to be heard. I suppose later on we might say something about that bill, but for the present nothing more.

The President—It is hardly necessary, Mr. Glass, I take it, that the details should go upon the minutes.

Mr. Glass—I think not.

Action on Public Service Bills Before the Wisconsin Legislature.

	No Action.	Rep. Ind. Post. Rec.	Ind. Post.	Rep. Pass. Rec. S.	Passed A.	Rep. Conc. Rec.
Commission government for cities	....	....	....	67 S	....	....
Commission, public lighting	790 A	....	....	....	170 A 732 A	
Condemnation proceedings	410 S 474 S 476 S	....	....	....	....	....
Contributory negligence	586 A 587 A	....	....	....	....	....
False statements	....	....	146 A	....	....	....
Franchises, forfeiture of	672 A	....	539 A	....	....	....
Milwaukee Gas Light Co	106 A	100 S	....	280 A	....	....
Exclusive rights	275 A	....	....	....	....	....
Milwaukee Gas Light Co	....	....	219 S	....	....	....
Range business	....	....	484 A	....	....	....
Public utilities, acquisition and operation of	2 S 35 S 173 A 628 A	....	....	522 S	627 A	....
Public utilities, ownership of	....	....	330 A 445 A	....	....	....
Public works departments, establishment of	....	....	....	....	395 A	....
Rates, authorizing municipalities to fix	92 S 488 S 649 A	....	293 A 704 A	....	....	....
Smoke nuisance	509 A	....	....	....	....	....
Standard for gas	476 A	....	....	....	....	....
Stealing gas	423 S	....	422 S	....	213 S	....
Stocks, holding	....	....	....	427 S	....	....
Stocks and bonds, issuing of	65 S 485 S 825 A	....	56 S	152 S	....	....
Stockholders' liability	27 A	....	....	....	....	....
Streets, use of, for laying pipes, etc.	....	....	717 A	537 A	470 S	470 S
Taxation and assessments	757 A 816 A	....	....	....	....	....
Taxes, distribut'n of	758 A	....	....	....	....	....
Trusts and combinations	....	....	117 S	....	....	....
Wages, payment of	66 S	....	....	....	....	....

The President—The next order of business is the address of the President.

President Corscot then read the following

INAUGURAL ADDRESS:

Gentlemen: For the sixth time in the history of the Wisconsin Gas Association we are assembled in annual session to greet old friends and form new, and I extend to you a most cordial welcome. We meet in the metropolis of the State in which are our homes and business interests. As a city, all of us are proud of Milwaukee, not so much for that which the general public "has made it famous," but because of its good order, its cleanliness, the happy home life that leaves its impress on the visitor, and the solid, conservative principle which characterizes and pervades its business activities.

At the first medting of the Wisconsin Gas Association, held in Madison, Feb. 12, 1902, 27 members responded to roll call. During that session the membership (including 6 associate members) was increased to 48, while at the last annual meeting the Association numbered 89 active and 44 associate members, making a total of 133, the present membership, which it is anticipated will be somewhat augmented during the present season.

The past year has shown a healthy increase in gas sales, and while labor and materials have advanced, this increase in sales has enabled many companies to voluntarily reduce prices.

The market for coke during the year has been good, by reason of a growing demand for this class of fuel because of its efficiency and cost as compared with other fuels.

The tar market is not encouraging, and prices are such that it is more advantageous to some of the gas companies to use it for fuel than to sell it at the present market price of 2 cents per gallon, or less. The Company with which the writer is connected has burned the greater portion of its tar during the past year, realizing 2¼ to 2½ cents per gallon, when compared in efficiency with Youghiogheny coal.

The agitation against corporations and the growing feeling in the minds of many that they should manage their neighbor's business as well as their own, have stirred up a sentiment in many communities that the gas business should come in with other public utilities for regulation by commission or otherwise.

That a State Commission, now in existence or to be created, which could properly investigate the subject and deal fairly as between the patrons of public utility corporations and those having investment therein, would be welcomed by all the gas companies of Wisconsin hardly admits of a doubt. The Commission so created ought to be clothed with the power—after careful investigation—of fixing standards, as well as rates, for the reason that a standard that might be maintained by a large company would not be reached by smaller companies with more limited facilities of manufacture or that manufacture but one kind of gas, nor should the gas standards be fixed so high, or made so expensive and burdensome, that any company would be compelled to go out of business or to do business at a profit less remunerative than that of any competitive business having no responsibility to the public and no possibility of loss by fire or explosion with no insurance to make good the loss.

We can but hope that the Legislature now in session will wisely and carefully consider all matters pertaining to the gas industry in Wisconsin and give us laws which will be fair to the people and not repel capital seeking investment in it.

In this connection your attention is called to the United States Census as a potent factor in disseminating half truths regarding the gas industry, in that it only gives statistics as to the cost of gas manufacture and leaves the public to infer that that is all the expense connected therewith, while everyone interested in the manufacture and sale of gas is fully alive to the fact that the cost of getting the gas to the consumer is nearly or quite as great as that of putting it into the holder ready for distribution.

It would seem that, if the Government gave any statistics as to our business, it should give not only the cost of manufacture but also the expense of sending the product to the consumer, as there is no place in Wisconsin, so far as known, where the consumer goes to the gasholder with a jug, basket or suit-case to get his daily gas supply.

During the past year the organization of the American Gas Institute was completed, and the three principal Gas Associations of the country were merged into the newly formed Association, making a strong national organization, fully equipped to consider all problems which may present themselves for solution.

While the formation of the American Gas Institute is cause for congratulation, in that it embodies in one general organization the best talent in the Union, it does not do away with, nor in any sense abridge, the work of the various State Associations, which, by reason of different laws and conditions, have a field for work and research peculiarly their own.

In conclusion, I desire to extend to the officers and members of the Association my thanks for whatever energy they have or may put forth to make the present meeting a success; and whether it shall prove to be such or not, the Secretary-Treasurer is entitled to the gratitude of the Association for his efforts in that direction. I trust it may prove a gathering of profit and pleasure to all. For the courtesies extended to me personally during my official term, I return my sincere thanks. [Applause.]

COMMITTEE ON PRESIDENT'S ADDRESS.

The Secretary—Gentlemen, it is customary to refer the President's Address to a committee for the purpose of reading over and reporting

upon it. I will appoint as such committee, Messrs. S. J. Glass, Julius Linstedt and H. M. Buck, and ask them to report to the convention proper to-morrow morning.

The President then introduced Mr. Henry I. Lea, of Chicago, who read the following paper on

A PROPOSED CLASSIFICATION OF GAS COALS AND OILS.

Over 300,000,000 tons of coal were used in the United States last year, and yet no generally recognized distinction exists between the various grades of coal. To be sure we have our commercial nomenclature, but any man who has been called upon to distinguish between the various grades of coal has certainly found the need of a scientific classification. The term "bituminous," for example, as we are compelled now to use it, embraces such a wide variety of fuels as to be of no value except in a very general way. Various schemes of classification have been proposed from time to time, but, as far as I have been able to learn, these schemes have all been attempts to cover the entire range of coals.

A summary of this work may be found in "Professional Paper" No. 48, part one, page 156, issued by the U. S. Geological Survey. In that paper, Mr. Marius R. Campbell presents a classification which is more complete than any other of which I have learned, but it, also, is designed for use in connection with fuel value determinations only.

By way of showing the present development in this matter I will review, very briefly, some of the earlier classifications, with that proposed by Mr. Campbell. Naturally enough, the first schemes were based on proximate analyses, or even on physical characteristics. For determination of fuel values alone these schemes are insufficient. A later classification was based on fuel ratios. The fuel ratio was determined by dividing the percentage of fixed carbon by the percentage of volatile combustible matter. While this classification applied through a small range, it made no provision for lignites, nor did it indicate truly the relative merits of some of the most important bituminous coals. In connection with lignites, a classification has been proposed based on moisture content, but this again is obviously at fault. A classification based on carbon content has also been proposed, but it fails in maintaining what would seem a proper distinction between lignite and bituminous coals. This is true also of the classification based solely on calorific value. A classification based on hydrogen content fails in maintaining the distinction between the anthracite of Pennsylvania and so-called semi-bituminous coals of Arkansas and West Virginia. The classification proposed by Mr. Campbell is based on carbon-hydrogen ratio. Under this classification, the figure indicating the relative value of a coal for fuel purposes is obtained by dividing the carbon content by the hydrogen content. This classification was based on a very great amount of work done by the Geological Survey at the coal testing plant in St. Louis and the summing up of Mr. Campbell's classification is shown below:

Proposed Groups of Coal and Allied Substances.

	Carbon-Hydrogen Ratios.
Group A—Graphite	00 to (?)
Group B—Anthracite	(?) to 30 (?)
Group C—Anthracite	30 (?) to 26 (?)
Group D—Semi-anthracite	26 (?) to 23 (?)
Group E—Semi-bituminous	23 (?) to 20
Group F—Bituminous.	20 to 17
Group G—Bituminous.	17 to 14.4
Group H—Bituminous.	14.4 to 12.5
Group I—Bituminous.	12.5 to 11.2
Group J—Lignite	11.2 to 9.3 (?)
Group K—Peat	9.3 (?) to (?)
Group L—Wood (cellulose)	7.2

With the adoption of the above scheme of classification it becomes possible to indicate the relative fuel values of a great number of coals in tabular form. With the aid of such a table the buyer of coal for steam purposes, for instance, can find the coal which will give him the largest return for his money by simply multiplying the tabular numbers of the several coals within reach of his plant by their respective prices delivered at his plant. I daresay that a very large percentage of all steam plants in this country could get decidedly better fuels for their money through the assistance of such a table. To illustrate the practical value of this classification, I give below a table compiled from the records of the U. S. Coal Testing Plant:

Groups B and C.

	Carbon-Hydrogen Ratio.
Anthracite culm from Pennsylvania Coal Company, Scranton, Pa.	26.7

Group E.

	Carbon-Hydrogen Ratio.
Semi-anthracite coal, half lump, half slack, from Spadra (or Denning) bed, mine No. 4, located west of Coal Hill, Franklin county, Ark., on the Mo. Pac. R. R., operated by the Western Coal and Mining Co., St. Louis, Mo	20.7

Group F.

Pocahontas (bituminous) run-of-mine from Zenith mines Nos. 1 and 2, located at Zenith, McDowell county, W. Va., on the Norfolk and Western R. R.. operated by W. H. Coffman, Bluefield, W. Va.	19.6
Bituminous (over 1¼-inch screens), from Huntington, or Jenny Lind bed, mine No. 12, located at Bonanza, Sebastian county, Ark., on the Frisco R. R., operated by the Central Coal and Coke Co., Kansas City, Mo.	19.3
Bituminous run-of-mine from New River Field (Quinnimont bed), Rush River Mine, located at Rush River, Fayette county, W. Va., on the Chesapeake and O. R. R , operated by the New River Smokeless Coal Co., New River, W. Va..	17.8

Group G.

Bituminous run-of-mine, Kanawha field (Powellton bed), Vulcan mine, located 1 mile above Powellton, Fayette county, W. Va., on the Cheaspeake and O. R. R., operated by the Mount Carbon Coal Co. (Limited), Powellton, W. Va.	15.7
Bituminous run-of-mine, Western field (No. 11 bed) Wheatcroft mine, located at Wheatcroft, Webster county, Ky., on the Ills. Cent. R. R., operated by the Wheatcroft Coal and Mining Co., Wheatcroft, Ky	14.6

Group H.

Bituminous run-of-mine, McAlester bed, No. 1 mine, located at Edwards, I. T., on the R. I. R. R., operated by D. Edward & Son, Edwards, I. T	14.1

Group I.

Bituminous run-of-mine, big vein bed, No. 5 mine, located in Liberty township, Marion county, Ia., on the Wabash railroad, operated by the Mammoth Vein Coal Co , Hamilton, Ia.	12.4

Group J.

Black lignite run-of-mine, Gallup field (beds Nos. 3 and 3½), Weaver mine, located 3 miles north of Gallup, McKinley county, N. M., on the Santa Fe railroad, and operated by the American Fuel Co., Denver, Col	11.2

The above are but specimens, and if further information of the above nature is desired it may be found in the report on the operations of the coal testing plant of the U. S. Geological Survey, issued by the Department of the Interior at Washington, D. C. Of course, the relative values indicated above will only be obtained in practice when each of the fuels is handled under the conditions best adapted to that particular fuel, but this is certainly a fair restriction.

While the work now being done by the Geological Survey is of great importance to the country at large and to the gas business incidentally, I believe the gas companies of the country would profit very much more through a systematic effort of tabulation of the relative commercial values of the coals and oils used in the manufacture of gas. It must be admitted that practically every gas company in this country buys its entire supply of coal and oil with a relatively meager supply of information as to what might be done with coals and oils from other fields. Obviously, no table can be prepared to show the commercial value of the given coal or oil in all cities, because of the widely varying freight rates and prices obtained for residuals.

It is possible, however, to so tabulate the results obtained with different gas coals and oils under specified conditions, that a given gas company can, from such data in connection with local prices, determine upon the coal or oil most advantageously used in a particular plant. I realize that objection will immediately be raised on the score of varied conditions of operation.

On this point I believe no valid objection can be held, because the conditions of correct operation of coal gas and water gas plants are now so well understood that we may reasonably insist upon getting, with a given plant and a given coal or oil, practically the same results at one place as may be had with similar plant and coal or oil in another place. To be sure, these tables must indicate specifically the size and type of apparatus yielding the results noted, as well as the general conditions of operation.

While it may be beyond the scope of the Geological Survey to conduct an investigation so specialized as this would be, it is very certain that we can secure the co-operation of the Geological Survey in obtaining a great deal of the data of value in this connection. But even without a plant operated specifically to get the information here required, we can, through comparison of results obtained with given coals and oils under given conditions, in the various gas works in the United States without doubt save a great deal of money in a great many cases.

I would, therefore, propose a classification of coals and oils used in gas making which would show the characteristics and bulk of the various products obtained—the coals yielding similar results all going into the same class. This, of course, is a distinctly commercial classification, but I believe its value to the gas industry at large would warrant a very considerable expenditure of time and money.

I believe that this is a subject too large for a State Association to handle, and I would therefore suggest that the Wisconsin Gas Association take such steps as may be required in requesting the American Gas Institute to take up the work involved.

I believe that the Institute, through a properly authorized committee, can secure from a sufficient number of American gas companies very satisfactory replies along the lines suggested by the headings below:

"Information, as complete as may be had, concerning the exact vein or veins and the mine or mines from which the coal is obtained."

"Proximate and ultimate analyses of fair average sample of the coal as used."

"Full description of benches in which the coal is carbonized, with statement showing conditions of operations."

"Statement showing volume or weight and characteristics of gas, coke, tar and ammonia obtained under average operating conditions."

For water gas plants, the corresponding information, concerning the coke or anthracite and the gas oil used, should be secured. The above headings are very far from covering the information required and are given merely to indicate the scope of the scheme in general. It is evident that the collection and tabulation of this data in such manner as to make it of real value to gas companies generally, would involve a great deal of painstaking work. It is the writer's belief, however, that no difficulty would be found in raising the money required for such work.

It is to be expected that this suggestion will meet with decided opposition from the coal mining interests at least, but objections of this nature are only in line with countless others that have had to give way before the advance of the industry. Such tabulation would doubtless have a great deal to do with the placing of future contracts for coal and oil and would render possible numerous savings, simply through giving authoritative information as to results being obtained in practice at other works. In the hope that some action toward this end may be taken shortly, this suggestion is submitted. [Applause.]

(To be Continued.)

Bench Fuel Economies.

[A paper read by Mr. F. M. Richards, of Madison, Wis., at the Milwaukee Meeting of the Wisconsin Gas Association.]

In the manufacture of coal gas the gas bench probably plays the most important part. There is an old saying that money is either made or lost in the retort house; whereas, this is not literally so, it contains a large element of truth. With the average gas company probably no other part of the plant is less understood or more abused than the gas bench.

The recuperator form of gas bench presents almost ideal conditions for efficiency and perfect combustion, and by its use at least 50 per cent. of the bench fuel can be saved over that required in the direct fired form of bench. In a recuperative form of bench the waste heat to the retorts passes through the recuperator and gives up a further quantity of the heat to the secondary air for the purpose of heating this air. The object in heating the secondary air is to increase the flame temperature of the combustion resulting from the burning of the producer gas with the heated secondary air. In a recuperative form of bench, heated by a producer furnace, the retorts in reality are heated by a system of gas firing; therefore, the purpose of the producer furnace is to afford a combustible gas largely composed of CO (carbon monoxide) and hydrogen.

In the operation of the producer furnace the temperature of the fuel bed has a natural tendency to increase to such a point that there is formed in the fuel bed a fusible slag, or non-combustible material generally known as clinker. This fusing together of certain of the non-combustible elements of the fuel causes a stoppage of the draft current, and as the clinkers fasten themselves to the furnace wall the satisfactory operation of the producer furnace becomes impossible. The amount of producer gas is not only decreased in quantity, but its quality is much impaired. Every character of fuel has a critical temperature, or a temperature at which a fusible mass is formed, which is commonly known as the clinkering temperature of the fuel. For the purpose of holding down, or restraining, this naturally high temperature in the furnace, water and steam have been used in large quantities; the steam passing up through the fuel bed has a cooling tendency or effect, by direct physical contact, and the cooling effect of the disassociation of the water into its elements, which disassociation is an eudothermic reaction.

The use of water or water vapor to restrain the rise of temperature throughout the bed of incandescent fuel is, however, objectionable, because there is loss of heat, due to the fact that as the water must be heated and evaporated from about 60° F. to steam at the temperature at which the waste gases or products of combustion ordinarily leave the furnace stack and pass into the atmosphere—say 800° F. or over—there is a resulting loss of about 1,400 B. T. U.'s for each pound of water thus evaporated. This is shown as follows:

Heat required to raise 1 lb. of water at 60° F. to 212° F.	152.00 B. T. U.
Water 212° F. to steam at 212° F.	966.00 " "
Steam at 212° F. to steam or gas at 800° F. (588 × 0.48)	282.24 " "
	1,400.24 B. T. U.

The specific heat of the steam in the waste products of combustion at the temperature specified, is approximately 0.48; and in the above calculations the heat of the eudothermic and exothermic reactions is disregarded. It will be observed in the above determination of the heat lost, due to the evaporation of 1 pound of water, that no account has been taken of the amount of heat required to disassociate the steam into its elements, hydrogen and oxygen, which is an eudothermic reaction, for the reason that the hydrogen is again burned back to steam in the combustion chamber, which is an exothermic reaction, whereby the same amount of heat is given out as was absorbed in the eudothermic reaction. For this reason the eudothermic and exothermic reactions balance each other, and have, therefore, not been considered in the calculation.

In addition to the loss of heat occasioned by the use of water, as illustrated above, there is yet a more serious objection to its use as a means of preventing the formation of clinkers—due to the fact that, in order to reduce the temperature throughout the entire bed of fuel below the clinkering point, it is necessary to introduce water in such a large quantity that the fuel in the immediate vicinity of the water pans and drip plates is reduced in temperature below that of ignition, or the temperature necessary to support combustion.

The proportion of water used per pound of fuel will vary from 33⅓ to 100 per cent. As a consequence, the fuel is quenched, which fact may be observed by opening the cleaning door of the furnace while in operation and noting that scarcely any live or burning fuel is visible; the furnace presenting the appearance from below of a fire that is almost extinguished, while the fuel bed, as viewed from above, shows that a high temperature exists in the upper part of the mass. The unburned fuel in the lower part of the fuel bed is raked down, intermingled with the ash, and is thus lost.

Moreover, it has thus far been found impossible in this type of furnace to entirely prevent the formation of clinkers by the use of water and steam. If enough water is used to reduce the temperature below the clinkering point, there is too great a loss of heat and fuel, while the use of an insufficient quantity of water results in an excessive formation of clinkers, attended with their accompanying evils.

In view of these conditions the customary practice has been to admit sufficient water, and (if necessary) steam in addition, so that the formation of clinkers will be reduced to such an extent that, by thoroughly cleaning the furnace at frequent intervals, the fuel bed will be maintained sufficiently free to obtain the proper amount of combustion. The clinkering of the fire is in practice attended with great labor and loss of fuel. During the operation of clinkering the cleaning door necessarily remains wide open, permitting an excessive rush of cold air to pass up through the furnace, thus rapidly reducing the temperature of the entire structure and resulting in alternate contraction and expansion of all the parts, "Which produce an increased leakage and reduce the useful period of the entire structure to a term of but a few years."

Is it a paying proposition to install and use a high grade of bench? The fact that the depreciation in the average gas bench is so rapid has induced many good gas men to feel that the cheapest bench in regard to first cost is the most economical. The very fact that this depreciation is so rapid is the one reason why this depreciation should be minimized as much as possible.

The Doherty Bench Fuel Economizer.—The invention embodied in the Doherty bench fuel economizer consists in returning beneath the grate bars, and up through the fuel bed, a portion of the waste products of combustion after they have parted with a portion of their heat to the retorts. These products of combustion, mixed with a proper percentage of air, carry on combustion of the fuel, the carbon dioxide probably disassociates at a lower temperature than steam in the presence of incandescent carbon; also, this disassociation, which is an eudothermic reaction, is much more thorough and complete than is the disassociation of water. By the use of this invention a large percentage of CO_2 at comparatively high temperature can be introduced and passed through the fuel bed and thus restrain and hold down the temperature in all parts of the furnace below the clinkering temperature; in this manner the formation of all clinkers can be prevented and a great saving of heat effected that would otherwise be lost.

In carrying out this process the mixture of carbon dioxide and oxygen should be led beneath the fuel bed at such a temperature, and the proportions of carbon dioxide, free oxygen and free nitrogen should be such that the fuel is kept below the temperature at which clinkering occurs—heat being given up to the gases from the fuel. The temperature at which clinkering commences to form, varies from about 1,500° to about 2,300° F., depending upon the character of the fuel and the amount of iron and silicon therein.

A mixture of about 4 per cent. of CO_2, 16 per cent. of free oxygen and 80 per cent. of free nitrogen, at a temperature of about 600° F. is suitable for a certain character of fuel which clinkers at a high temperature; and another mixture of about 10 per cent. of CO_2, 10 per cent. of free oxygen and 80 per cent. of free nitrogen at a temperature of 700° F., has also been found suitable with another fuel which clinkers at a much lower temperature. The higher the temperature of the gaseous mixture admitted beneath the fuel bed the larger should be the proportion of CO_2 found in the mixture which is necessary to keep the temperature of the fuel bed below the clinkering yoint. It was found that the mixture of CO_2, free oxygen and free nitrogen operates satisfactorily if injected at a temperature of from 600° to about 800° F., in which case heat is given up to the gas from the fuel and clinkers are not formed. The proportions above mentioned are varied by means of dampers on the injectors. If the ordinary atmospheric air, which contains about 80 per cent. of nitrogen, is used, the percentage of nitrogen in the mixture would be the same as in the air and in the products of combustion. The percentages of nitrogen in unburned air and in the products of combustion after the air has been burned with coal are the same; the oxygen being converted, volume for volume, into CO_2 when the combustion is complete. The products of combustion are the natural source of the CO_2 used in this process, and these, having about 80 per cent. of nitrogen, maintain the proportions of the mixture at 80 per cent. of nitrogen. If carbon dioxide without attendant nitrogen from any other source be mixed with the air the percentage of nitrogen will be somewhat less. If the temperature of the mixture of air and gases applied to the fuel bed is considerably less than the temperature of the fuel bed, the gases will in themselves (as is well understood) affect the physical absorption of some heat from the fuel bed.

The temperature of incomplete combustion in the furnace is usually carried on at approximately from 1,800° to 2,000° F., while the temperature of complete combustion carried on in the combustion chamber where the heated secondary air supply is admitted will usually be considerably higher—frequently 2,500° F. or more. The temperature of the retorts should be about 2,300° F.; and the waste products of combustion, after circulating around the retorts, enter the top of the recuperator at about 2,000° to about 2,200° F.

These products of combustion are cooled down in the recuperator before entering the chimney to between 800° and 1,000° F., and a portion of the product is intercepted at a suitable point after heating the retorts, and mixed with air at atmospheric temperature, so that the mixture injected will range about 600° to 800° F. As the appearance of the fire bed furnishes a direct guide to the temperature that is being maintained therein, it also furnishes the best guide for proportioning the quantity of CO_2 admitted to get the lowest temperature desirable, it being preferable to admit a little more rather than a little CO_2.

At Madison, Wis., we have four ¼-depth benches of 6's equipped with the economizer, part of which have been in operation about 1½ years. On account of our excellent coke market, and as a result of numerous experiments with various grades of bituminous coal used as bench fuel, Youghiogheny lump coal (¾ inch screened) was used under these benches during the year 1906. No changes were made in the benches or their operation other than the installation of the economizers and changing from coke to Youghiogheny lump coal as fuel, together with the refilling of two arches with the Improved Equipment Company's design of bench. A fair idea of the performance of these benches during 1906 over the performance of the previous year, will be gathered from the following:

	1906.	1905.
Coal gas made	69,669,100 cu. ft.	61,034,400 cu. ft.
Kind of coal used	Youghiogheny.	Youghiogheny.
Coal carbonized	7,005.5 tons.	6,208.4 tons.
Yield per pound coal	4.97 cu. ft.	4.92 cu. ft.
Cost per ton in shed—coal	$4.03	$3.93
Average number retorts in use	18.39	17.41.
" charge per retort	348 pounds.	326.6 pounds.
" make per retort	10,380 cu. ft.	9,621.3 cu. ft.
" make per man—24 hours.	30,280 cu. ft.	27,622.9 cu. ft.
Coal or coke used for bench fuel per ton of coal carbonized	201 92 pounds.	404.3 pounds.
Saving in bench fuel (709 tons, at $4.03)	$2,857.27	
Saving in bench repairs	146.30	
Gross annual saving on 4 benches		$3,003.57 [1]

Cost of Producing this Saving.

Royalty charge—7,005 tons at 3 cents	$210.15	
10 per cent. annual interest and depreciation on additional first cost	169.32	
Gross cost		$379.47
Net saving		$2,624.10

$2,624.10 = 155 per cent. annual return on additional investment; or the net saving of $2,624.10 will pay 6 per cent. on $43,735.

It is decidedly interesting to the writer (who takes part in the management of this property) that a still further saving of from 8 per cent. to 10 per cent. in bench fuel is to be effected during 1907.

Average bench fuel per ton of coal carbonized, July 1, 1906, to Jan. 1. 1907	182.13 pounds.
Jan. 1, 1907, to May 1, 1907	184.14 pounds.

During the latter period, the benches were out of service for 6 days on account of labor troubles, during which time the heats were maintained about normal.

The Madison management will be pleased to entertain any members of the gas fraternity who desire to visit us and acquaint themselves with the conditions which are producing the above results.

[Prepared for the Journal.]

The Lighting of Modern Garages and Grounds.

By "Engineer."

The general introduction of garages, and grounds for garages for automobiles, has developed a new field for lighting interior and exterior premises. There have been a great many garages established in the United States, Germany, France, England and in fact all countries during the past few years, and the gas and electric men have been called upon to install systems for the lighting of the same. Owing to the fact that a great many automobiles are operated by means of gasoline, or gases derived from other sources, the tendency has been to utilize equal substances in the lighting of the garage buildings and the grounds. Therefore, we find several different kinds of lighting systems in use for the modern garage and the surrounding grounds. In some cases the system of lighting is conducted with electrical wiring, regardless of the nature of the substance used for power purposes in the machines; but, as a rule, oil and gas tanks are established in the garages for the furnishing of oil and gases to the motor cars. Therefore, it becomes an easy matter to use these tanks of oils or gases for the lighting of the building, the rooms and the grounds.

There have been some very finely planned garages and grounds arranged in recent years, in which tourists not only obtain shelter for themselves and machine overnight, but where the oil or gas tanks may be filled and repairs made to the machinery, if necessary.

1. Considerable additional saving would be shown if additional yield and carbonizing capacity were taken into account.

The accompanying sketches will give the reader an idea of the

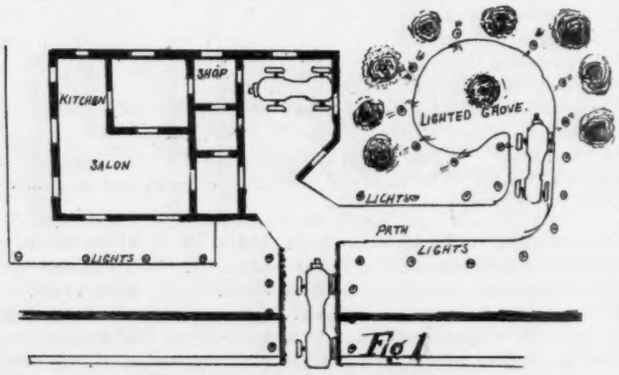


Fig 1

PLAN OF LIGHTS FOR THE MODERN GARAGE.

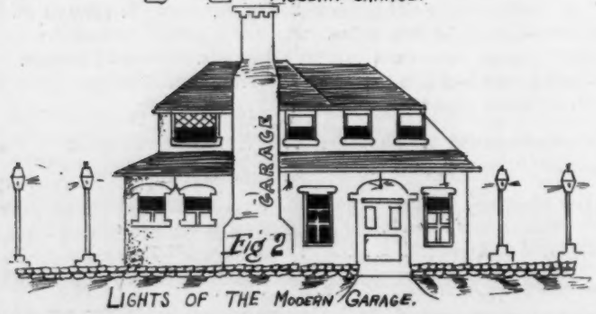


Fig 2

LIGHTS OF THE MODERN GARAGE.

elaborateness of some of the plants. In the proper lighting of the buildings and grounds the gas arc is often used. Sometimes the lighting is effected with an acetylene outfit. A tank is arranged for in the grounds, and the proper generator installed for bringing the carbide into contact with the water for producing the gas. This gas is distributed throughout the buildings and the premises. In some cases patent gases are employed. Gases are formed from the vapors of gasoline and the gases are carried under pressure through pipes to a mantle and ignited. A bright, white light is sent over the surrounding territory and the grounds become fairly well lighted; but a high wind interferes with the mantles unless they are protected quite completely. Therefore, another form of gas producing outfit is used in some places, consisting of burning carbide or acetylene gas with a compound of modified oxygen gas. The gases are used in the same jet, making a light very much like one of the calcium type. Then another form of light in use for lighting garages and surrounding grounds is found in burning oxygen and hydrogen gas through a blowpipe. The force of the gas strikes on a deposit of lime where the gas is ignited, heating the lime to a white heat. A very intense light results, which may be thrown about the grounds by the aid of reflectors. Alcohol vapor lights are also used to some extent in lighting garages. In fact, the advent of the garage has been the agent or means of inducing inventors of lighting devices to introduce many new forms of illuminating schemes.

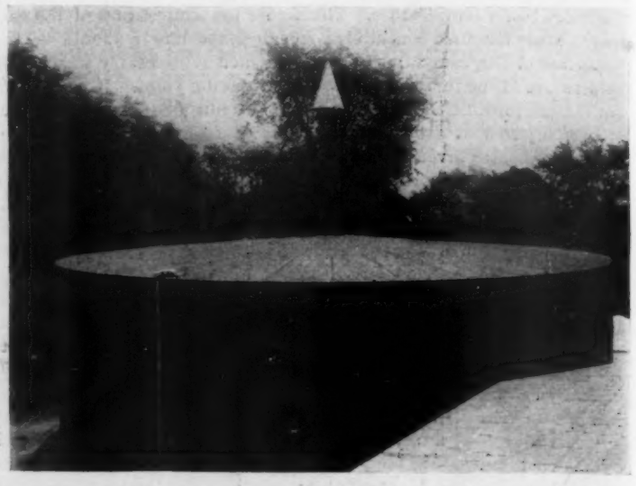
In one form of alcohol vapor light the alcohol is converted into a vapor by heating the tube through which it passes towards the point of ignition. The tube is heated by another alcohol light. The vapor mingles with the air and a combustible material results which burns with considerable activity, under pressure on a mantle, and sheds its rays over a goodly sized area.

Calcium gas making outfits also can be obtained for the lighting of modern garages. Often the plant is installed in the center of the grounds, where the system of reflectors is used for shooting the bright rays in the various directions for lighting the paths and apartments In one type of calcium outfit which I noticed in use for a garage plant, a saturator was used—the saturator is that part which makes the hydrogen, in the event that you cannot draw your hydrogen from the building pipes. There are isolated garages where various kinds of gases have to be made for lighting purposes. The saturator is filled with a porous material like cotton, saturated with 88° ether or gasoline, but in using the outfit the rubber tubes often get out of order. The limes are not always at hand, and the carelessness of operators frequently injures the delicate outfit and you get no gas. However, with careful handling the outfit will light up well.

There has been a great tendency to introduce gas arcs for lighting garages, and I have seen many gas arcs in use on this score. In the annexed diagram of the plan of lights for a modern garage, the entrance to the grounds is through the hedge, in front as shown. A system of poles is arranged on either side of the auto way, leading to the right to the lighted grove, or to the left to the barn of the machines. The enterprising club men and others interested in automobiling are erecting plants of this nature through the country, and in every case I noticed that considerable attention is given to the lighting of the building and the grounds. There are also private individuals, who have no connection with automobile clubs, that are erecting garages of this kind in view of getting the patronage of the motorists as they travel through the country. There are poor accommodations for the tourist in the ordinary hotel, hence the demand for a specially arranged auto hotel with garage and grove. The floor plan of the building signifies the usual location of the different apartments. These apartments have to be liberally lighted. In order to get the patronage of the modern automobilist, the proprietor of the establishment has to show that he has the necessary accommodations. This he does with his lighting plant, and as he keeps his lights burning well into the night he picks up many tourists if he is on a main thoroughfare in the country. Garages of this kind which are situated a few miles out from a large city pay well. If near a gas company all well and good, because you can get your supply from there. In the event that the distance is too great, any of the various devices for making gas on the grounds can be installed and used profitably.

An Ancient Gasholder.

We are indebted to the attention of Mr. R. M. Searle, General Manager of the Rochester (N. Y.) Railway and Light Company, for the picture herewith of a center-post holder that was constructed for the Canandaigua (N. Y.) Gas Light Company in 1853. If we mistake not it was built by Poole & Hunt, of Baltimore. The illustration is so



plain that pen picturing of its peculiarities seems unnecessary. Mr. Searle, who is in charge of the reconstruction plannings for the new works at Canandaigua has arranged with the Cruse Kemper Company, of Philadelphia, for the erection of a 60,000 cubic feet capacity holder of their approved method of construction.

The Rare Earths and the Incandescent Mantle.[1]

By Mr. Frederic Bonnet, Jr.

Forty years ago scarcely anyone thought that the rare earths would ever become technically important. The very fact that the minerals in which they occurred were found in so few localities and in so limited quantities argued that but a few years at best would suffice to consume the entire stock of available raw material. While the absolute quantity in which these earths occur is by no means small, traces having been found in some very common minerals like apatite, and also in plant ashes and animal secretions, there are only a few minerals which contain them in any considerable quantity. Even in these the

1. "Jour. Worcester Polytechnic Inst."

earths do not occur singly, but several are invariably associated and substitute one another. Thus cerite, which is essentially cerium silicate, containing from 50 to 70 per cent. cerium oxide, contains also neodymium, praseodymium and lanthanum silicates in greater or less amount depending upon the locality in which it is found.

While an analysis of a mineral containing 15 or 20 of the ordinary elements might be a tedious process, it would not necessarily be a difficult problem. In the case of the rare earths, however, the complete separation of one earth from the other is beset with great difficulties. This is largely due to the chemical nature of the substances involved. They are so very similar in their chemical behavior that the usual analytical methods fail completely. In the place of qualitative analysis, spectrum analysis is employed, and for quantitative analysis, special methods must be used, which are not only very tedious but may involve considerable loss of material unless each step in the procedure is very carefully manipulated.

The separations are accomplished by "fractionation and recrystallization" methods, which the Curies in Paris made use of in the preparation of radium. These methods were first successfully employed in the early part of the 19th century and have made possible the isolation of a number of new elements. The best known of these, which for the present at least may be considered elemental, are, cerium, lanthanum, neodymium, praseodymium, terbium, erbium, gadolinium, europium, dysporsium, holmium, thulium, yttrium, ytterbium, zirconium and scandium. Thorium and its radioactive associate, actinium, might be added owing to its occurrence and also to its properties. In giving this list, however, the number of possible, even probable, elements is by no means exhausted, for each year brings new discoveries and the whole group of rare earths doubtless has still many surprises in store for us.

The suggestion to make the rare earths useful for illuminating purposes came from a number of the earlier investigators. Berzelius, the great Swedish chemist, Bunsen, the German, and Delafontaine, the Frenchman, had each described the properties of thorium, cerium and zirconium compounds and each had made especial mention of the intense white light emitted by the oxides of these elements at the temperature of a non-luminous gas flame.

In the early eighties Auer von Welsbach became interested in the chemistry of the rare earths. The incandescence of the oxides particularly fascinated him and filled him with a desire to make them useful. Taking up the matter from a purely scientific interest, he decided that the first requisite was pure material; *i. e.*, pure oxides were necessary. In endeavoring to prepare pure didymium oxide, he tried recrystallizing the double ammonium nitrate, a method suggested by the late Mendeléeff. To his surprise he obtained two differently colored salts, one pink, the other a pale green. Didymium was not a true element, therefore, but was made up of two elementary substances which Welsbach called respectively, neo and praseo-dymium. This remarkable discovery led him to investigate the other earths with great zeal, among them thorium oxide, which greatly surpassed all the other oxides in luminescence. In a comparatively short time a serviceable mantle was produced, and a factory for the manufacture of mantles was erected at Atzgersdorf, near Vienna.

Unfortunately Welsbach was called away from his investigations just at the time when a company was formed to finance the undertaking. The services of Dr. Ludwig Haitinger, as head chemist, were secured. Although the chemistry of the rare earths was entirely new to him, he very soon familiarized himself with every phase of the subject. He designed and equipped the laboratory at Atzgersdorf for the production of mantles, and incidentally developed a regular business for the preparation of rare earth compounds. Not only is great credit due him for calling into existence an entirely new industry, but also for his many scientific investigations in this difficult field. It may be mentioned in passing that he is still a director in the original Welsbach Company. Later on Welsbach returned to his old work and he forthwith set about to improve the illuminating power of the mantles, which was not entirely satisfactory, but with little success. The industry of such great promise began to dwindle, and gradually a sort of stagnation set in. For Welsbach this was a trying time. The capitalists, whose expectations had not been fully realized, began to complain or at any rate demurred at further investment. Instead of giving Welsbach time and opportunity for further investigations, they threatened him with legal proceedings. The chemical works at Atzgersdorf were closed and the large number of chemists employed were discharged. With faith in his own work, Welsbach bought the factory and was for some time its only chemist. Something had to be done to save the situation. Again Welsbach experimented with all kinds of substances, but to little use; it seemed impossible to improve the incandescent mantle.

In one of his earlier experiments Welsbach had found that the addition of small amounts of thorium oxide to other oxides, like magnesium, lanthanum or zirconium oxide, increased their luminescence greatly, but after 50 or 60 hours' service their intensity gradually diminished until it was about the same as when no thorium had been added. This falling off suggested the thought that thorium had not been sufficiently investigated scientifically; in other words, that thorium was not a true element. A considerable quantity of raw thorium oxide had come into the possession of Welsbach with the purchase of the Atzgersdorf laboratory. With this he set to work, incidentally improving the methods for preparing rapidly large quantities of thorium salts in a state of purity. His surprise may be imagined when he found that the purer the thorium oxide was, the less light did it give out. The impurity causing the luminescence was looked for in the solutions from which the purest oxide had been obtained and subsequently was identified as a cerium compound. The synthesis of the mixture of 99 per cent. thorium amd 1 per cent. cerium oxides, giving a maximum luminosity, was comparatively easy to determine, and resulted in the brilliant light so familiar to all.

Welsbach made this discovery in October of 1891. At that time the value of patents for incandescent mantles had dropped to a minimum, and it was high time that the new light came if its few faithful adherents were not only wholly to disappear. In an incredibly short time the new mantle swept the entire field of gas illumination.

The demand for thorite, and minerals containing thorium, became very great. Prices rose rapidly and a veritable thorium craze—like gold fever, ensued. Unfortunately on the strength of a faulty analysis or otherwise, a rumor gained ground that a rather common mineral, probably rutile or titanite, contained thorium. Agents of German firms were sent to Norway and Sweden to buy every obtainable quantity of it, paying in some instances as much as $12 a pound for it. The news spread like wild-fire along the coasts of Sweden and Norway (Arendal, Krageroe, Brevig, Hetteroe, Bastnas, Ytterby). People who had not a copper dreamed of coming into thousands. Men and women, little boys and girls, almost anyone who could swing a hammer, pounded and chiselled away in the most inconceivable places. Stones were torn from walls and buildings. Small desolate islands of solid rock rose enormously in value. One woman sold the ballast stones of her washing mangle for several hundred crowns. Even learned professors took advantage of conditions and sold some of their thorium specimens and preparations to defray the expense of special costly investigations.

The reaction, however, soon set in, when the mineral erroneously thought to contain thorium was no longer marketable. As of old, thorium minerals had laboriously to be sought for and collected. In spite of the great demand, the price of thorium minerals began steadily to decline. Orangite, thorite and monazite, which at one time brought $150, $125 and $20 respectively per kilogram, a few months later could be purchased for one-sixth of the above values. This phenomenon is not added as a novelty; it is merely history repeating itself. Whenever there is a sudden great demand for a mineral because of its extended application in daily life or to an industry, its price rises rapidly. Every energy is then put forth to seek it, and behold it is found either in unexpected places in large quantities, or old deposits are opened up and developed profitably. Thus it was with the niter beds; so it was with the natural phosphate fertilizers; so with petroleum and with gold, and so it was with thorium.

The thorium minerals which had almost exclusively been found in Norway and Sweden, and then in but comparatively small quantities, were discovered in the gold fields of Brazil and Australia, in the Ural Mountains and in the United States. Nature had deposited enormous layers of monazite sand in these countries, and thousands of tons found their way into the various laboratories which had sprung into existence to supply the demand for mantles. In a very short time, rather to the surprise of the scientific world, an industry of the rare earths was developed, and soon thousands upon thousands of mantles took the place of the ordinary fishtail and Argand burner, giving not only more light but using only one-fifth of the amount of gas for the same illumination.

The treatment of such large quantities of monazite sand, essentially for the thorium oxide, of which it contains from $\frac{1}{4}$ to $\frac{1}{5}$ per cent., incidentally involved the production of a large quantity of waste material. Only a small amount of the cerium oxide present (50 per cent. or more in monazite) was purified, for as we have seen, the suitable composition for a mantle is 99 per cent. thorium oxide and only 1 per cent. cerium oxide. While the impure raw material was not thrown away, few mantle

works undertook to separate and purify the constituents. It is to the credit of America and American research that the American Welsbach Company, at Gloucester City, N. J., under the direction of Waldron Shapleigh, was the first to place large quantities of the various rare earths and their products in unexcelled technical purity upon the market. A French firm near Paris, and a German firm in Saxony, now also produce very pure rare earth compounds.

Aside from thorium, no very great technical uses have as yet been found for the rare earths and their compounds. Yttrium, ytterbium and zirconium oxides find application in the Nernst lampt Zirconium, the metal, owing to its very high fusing point, has made it possible to produce an incandescent filament lamp with a rating of 1.3 watt per candle power which exceeds that of the very economical tantalum lamp by ½ watt. Zirconium oxide, with its high fire resisting qualities, promises to open up a new and interesting field of investigation in ceramics. Pure cerium oxide has been found useful as an oxidizing agent in the dyestuff industry; while impure cerium oxide has been applied with great success to the modern flaming arc light, in which the carbon rods are impregnated or the cores filled with this oxide. In comparison with the constantly increasing amount of material at hand, these uses are very small indeed. Since, however, pure starting material can now be obtained, investigation in this interesting rare earth field is much simplified and offers most excellent opportunities for the young chemist.

A Brief Theory of the Reduction in the Service Life of Frosted Incandescent Lamps.

By Dr. A. E. Kennelly, in *Elec. World.*

In the *Electrical World* for March 17, 1906, Vol. XLVII , No. 11, page 567, Messrs. J. R. Cravath and V. R. Lansingh published the results of a series of observations made at the Electrical Testing Laboratories of New York. The observations were made on incandescent lamps in diffusing globes. One set of clear lamps was used, each inside a holophane diffusing globe. Another set of similar lamps were made diffusing by frosting, *i. e.*, by dipping their bulbs in an acid bath. It was found that the average useful life of the clear lamps in diffusing globes was almost twice as long as that of the frosted lamps, although the initial candle power of the frosted lamps was greater than the initial candle power of the inclosed clear lamps. In other words, the frosted lamps fell to 80 per cent. of their initial candle power about twice as quickly as the inclosed lamps. The frosted lamps fell to 80 per cent. initial candle power in 216 hours, while the holophane-inclosed clear lamps fell to 80 per cent. initial candle power in 428 hours. No reasons for this remarkable contrast in behavior were assigned.

Mr. Preston S. Millar contributed an article on the nature and cause of this phenomenon to the *Electrical World* for April 20, 1907, Vol. XLIX., No. 16, page 798. The article points out that a considerable diminution in candle power was "due undoubtedly to the action of the increasingly dense carbon deposit in absorbing a gradually increasing proportion of the light which the frosted surface reflects and diffuses internally.

It is the object of this article to offer a simple, rough quantitative theory, in conformity with the above quoted statements, and with the numerical results reported in Mr. Millar's article. It is not pretended that the brief theory here outlined is complete or rigid, but merely that it is simple and that it satisfies the numerical values reported in this case with sufficient precision for practical purposes.

The reported numerical values are briefly as follows (page 799, April 20, 1907): A group of new clear lamps, a group of similar clear lamps burned to 88 per cent. of initial candle power, and a group of similar clear lamps burned to 80 per cent. of initial candle power, were tested for the horizontal transparencies of their bulbs, which were observed to be .95, .843 and .883 respectively. When these lamp bulbs were acid frosted, their candle powers were found to be immediately lowered in the further respective ratios of .94, .857 and .811. These reductions may be called the *frost reduction factors* under these conditions. In commercial practice the reduction would probably be still greater, owing to the aggregation of a dust layer on the frosted bulbs. This additional dust reduction is necessarily a variable quantity, and depends upon the conditions of service as well as upon the care taken in keeping the lamp bulbs clean. We may, therefore, exclude the effects of dust and dirt in this inquiry, and consider only the "frost reduction factor" of a clean lamp.

For simplicity, let us suppose that the lamp filament emits 1 lumen of flux of light from a point source at the center of a spherical bulb emitting light in all directions. Let a be the transparency of the glass walls. Then the quantity of light emitted by the lamp, if the bulb is clear, will be a lumens. As the lamp continues to burn, the numerical value of a diminishes, owing to the deposit of carbon on the inside of the glass. For a new lamp, an 88 per cent. lamp and an 80 per cent. lamp, we may take $a = .95$, $a = .883$ and $a = .843$ respectively, in accordance with the data given.

If, however, the external surface of the glass is roughened by frosting, each rough glass particle acts as a secondary source of light and throws light in all directions. The more nearly perfect the diffusion of light secured by the frosting, the more nearly complete will be the scattering of the light in every direction. In the case of complete diffusion, when the outlines of the glowing filament within the lamp become completely concealed, every particle of the surface will throw half its received light outwards into space, and throw the remaining half back into the bulb. If, however, the frosting is not so deep as to secure perfect diffusion, the outlines of the glowing filament will be indistinctly perceived, and more than half of the light reaching the external side of the bulb will be thrown off, the lesser and remaining share being thrown back into the bulb. Let this diffusion coefficient of frosting or coefficient of frosting be denoted by m. The minimum value of m, or the minimum ratio of outwardly emitted to total received light, will be .5 for a perfectly diffusing frosting, and the maximum possible value of m for very light frosting would be 1.0. The greater the value of m between these limits, the less the diffusion and the clearer the bulb.

With 1 lumen steadily emitted by the filament, the flux of light reaching the frosted external layer of glass on the first emergence is a lumens. At the frosted layer of coefficient m, there will be $m\,a$ lumens radiated off into space and the remainder, $a(1\text{-}m)$ lumens, will be thrown back into the glass to re-enter the bulb. In returning through the glass wall into the interior, this flux will be diminished by the transparency factor a and $a^2(1\text{-}m)$ lumens will reach the interior. This flux will traverse the interior of the globe in all directions and emerge for the second time to the outer frosted layer, after undergoing reflection by a, so that the flux on second emergence is $a^3(1\text{-}m)$ lumens. Here it is again subdivided, a portion $a^3m(1\text{-}m)$ lumens being radiated outwards to accompany the first stream, and the remainder $a^3(1\text{-}m)^2$ returning back into the glass, to enter the bulb and emerge for the third time as $a^5(1\text{-}m)^2$ lumens at the frost layer. Again there will be subdivision, $a^5m(1\text{-}m)^2$ radiating outwards and $a^5(1\text{-}m)^3$ returning inwards. Proceeding in this way we find the total flux of externally radiated light is

$$\Phi = am + a^3m\,(1\text{-}m) + a^5m\,(1\text{-}m)^2 + a^7m\,(1\text{-}m)^3 +$$

$$\text{or } \Phi = am\left\{1 + [a^2\,(1\text{-}m)] + [a^2\,(1\text{-}m)]^2 + [a^2\,(1\text{-}m)]^3 +\right.$$

$$\text{or } \phi = \frac{am}{1\text{-}a^2(1\text{-}m)} \text{ lumens.} \qquad (1)$$

The total flux which would have radiated out had the bulb not been frosted, is the stream of first emergence:

$$\Phi = a \text{ lumens} \qquad (2)$$

So that the ratio of light radiated when the bulb is frosted to the light radiated when clear would be

$$\frac{\phi}{\Phi} = \frac{m}{1 - a^2\,(1\text{-}m)} \qquad (3$$

which ratio we may call the "*frost reduction factor.*"

If $m = .5$ for a frosting of perfect diffusion, so that each emergence 50 per cent. of the light is radiated out and 50 per cent. thrown back into the glass wall, we have:

$$\frac{\phi}{\Phi} = \frac{1}{2 - a^2} \qquad (4$$

If, on the other hand, $m = 1$, for perfect translucency, or a frosting so slight as to produce no appreciable diffusion,

$$\frac{\phi}{\Phi} = 1 \qquad 5)$$

or we return to the case of a clear bulb, with no diminution in candle power due to frosting.

It is evident that the greatest diminution of candle power due to frosting is with $m = 0.5$, the case of perfect diffusion, as represented by formula (4). The following table gives the frost reduction factor for various transparencies of glass wall, as obtained from this formula:

TABLE I.

Frost Reduction Factors for $m = 0.5$ or Perfect Diffusion.

Transparency of Bulb Wall. a	Frost Reduction Factor. $\frac{1}{2-a^2}$
1.	1.
0.95	0.912
0.9	0.842
0.85	0.783
0.8	0.735
0.75	0.696
0.7	0.662
0.65	0.634
0.6	0.61
0.55	0.59
0.5	0.572

It appears from the above table that if the initial transparency of a clear globe is 0.95, corresponding to 5 per cent. absorption, the frosting reduction factor is 0.912, representing a further diminution of 8.8 per cent. due to frosting and to the diffusion which is thereby produced. As the transparency diminishes, by reason of blackening of the glass wall, the frosting reduction factor dwindles or the extra loss of light due to frosting becomes greater. In no case, however, can the reduction factor fall below 0.5.

By reference to the data furnished in Mr. Millar's article, we obtain through formula (3) the following values of m for the three groups of lamps tested:

TABLE II.

Diffusion Coefficients as Computed from Tests.

Type of Lamps.	Observed Bulb Transparency. a	Observed Frost Reduction Factor. $\frac{m}{1-a_2(1-m)}$	Computed Diffusion Coefficient. m.
New.....	0.95	0.94	0.60
Burned to 88 per cent. i.c.p...	0.883	0.857	0.57
" 80 " " ...	0.843	0.811	0.56

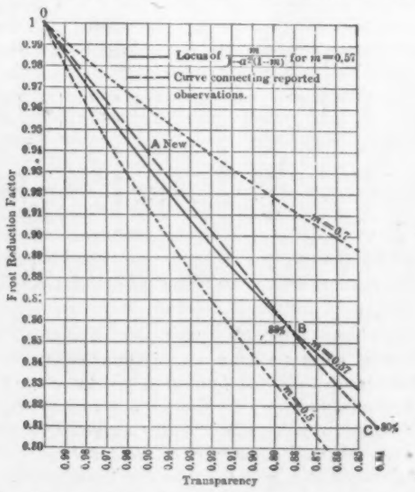
Table II. shows that the diffusion coefficient m comes out .6 for the new lamps, .57 for the 88 per cent. lamps, and .56 for the 80 per cent. lamps. Taking the middle value $m = .57$, we obtain the following schedule of frost reduction factors:

TABLE III.

Frost Reduction Factors for Different Transparencies with $m = .57$.

Transparency. a	Frost Reduction Factor. ϕ/Φ
1.0	1.0
0.95	0.932
0.9	0.874
0.85	0.828
0.8	0.786
0.75	0.752
0.7	0.713

The reduction factors of Table III. as deduced from formula (3) are represented by the heavy curves of the accompanying figure. *A B C*



Curve of Frost Reduction with Relation to Transparency.

are the observed reduction factors, connected by the broken line. The figure shows that the value of .57 for m satisfies the observations fairly well. The lower line of points indicates what the frost reduction factor might be expected to be with $m = .5$, or perfect diffusion; while the upper line of points indicates what might be expected if the value of m were increased to .7, representing less diffusion, lighter frosting and greater translucency.

The figure shows that if $m = .7$, the frost reduction factor would be .925 for $a = .9$; whereas with $m = .57$, as observed, the factor is .875 for $a = .9$. That is, an absorption of 10 per cent. in the lamp wall would be accompanied by an additional frost loss of 7.5 per cent. with $m = .7$, whereas it is accompanied apparently by 12.5 per cent. with $m = .57$, and a pure diffusion frosting of $m = .5$ would increase this frost loss to 16 per cent.

The deduction from the theory is, therefore, that the frosting of lamps should be as light as possible consistent with ease to the eye. If the lamps are unfrosted, the frosting loss is nil, but the brilliancy of the naked glowing filament is unpleasant to the eye. If we could frost to the limit $m = .5$ of pure diffusion, we should cease to perceive the outlines of the glowing filament, and only see the lighted bulb; but the frosting loss is 16 per cent. for a transparency $a = .9$, or 10 per cent. absorption in the walls, a condition reached after some 200 hours of burning. A compromise is to be aimed at between diffusion of light or lessened brilliancy on the one hand and frost reduction factor on the other.

The preceding theory, applied to the ordinary incandescent lamp, ignores a number of deviating circumstances. It can only be relied upon if checked by tests such as those above considered.

If only a portion of the lamp bulb be frosted, the theory becomes much complicated and involves the shape of the lamp bulb. It is probably not worth while attempting to supply numerical corrections. If formula (3) is applied, it is to be expected that the apparent value of the diffusion coefficient m for a zonally frosted lamp would be higher than that of a completely frosted lamp. Whether a single value of m would apply throughout a practical range of diminishing transparency can only be determined experimentally.

A Brazilian Gas Office Building.

The illustration shows the office quarters in Rio de Janeiro, Brazil, of the Societie Anonyme du Gaz de Rio Janeiro, which Company is the one over the general engineering management of which Mr. A. B. Slater presides. It is located in the business heart of Rio, on Avenida Central, and the photograph was taken the morning of the day when all Brazil turned out to welcome General Rocca, of the Argentine Re-

public—hence the decorations We are indebted to Mr. Lewis J. Carder for the photograph. It might be here properly said that Mr. Slater and Mr. Carder send their heartiest greetings to the gas men of the States and Canada. In fact, Slater says that while Brazil may be great, America is certainly greater; a sentiment over which Carder completely agrees.

Making Gasoline From Gases.[1]

In reply to inquiries on the subject, which of late have notably increased, we reproduce here in part an article from our issue of December, 1905:

"As noted heretofore in these columns, the publication a few months ago of some items grouped under the heading 'Gas from Oil and Oil from Gas' was productive of a surprising number of inquiries on the subject. These inquiries continue. The following letter is selected as a representative one and the answer offered is submitted as a reply as well to others of like character:

"'Some time ago there appeared in your paper an article relating to the manufacture of gasoline from natural gas taken from oil wells near Titusville. Can you suggest an explanation of the same? Can gasoline be made from oil wells in other parts of the country, and if not, why not? In the Titusville instance the gas is drawn from the wells with pumps and some stress is laid on the fact that it is 'gas pump territory.' What in your opinion has that to do with the results? It is hardly to be supposed that pumps account for the presence of gasoline, though they may have something to do with its production and conversion. It is a subject very interesting to oil producers and any information you can give on the subject will be appreciated.'

"The explanation offered in reply to the foregoing is that the gasoline obtained in the instance referred to is the result simply of exposing the gas drawn from the wells to enough cold surface in the pipes to chill to a liquid state some of the light hydrocarbon vapors the gas carries. The fact is well known that the colder the weather the greater the quantity of gasoline that will collect in gas lines and drips. With reference to the effect of gas pumps in relation to the quantity of gasoline obtained they increase it by volatilizing more of the heavier products than the gas would be charged with under ordinary atmospheric pressure, which the gas pumps overcome. Answering the question as to whether gasoline can be made from gas taken from oil wells in other parts of the country, the opinion is expressed that it can be, also that it will be in consequence of the many experiments now evidently in progress, and of others which will naturally supplement them. The general information on this subject, including that of the *Petroleum Gazette*, is superficial rather than scientific, but it is not a hazardous prediction to say that, however the details may work out, the two considerations of temperature and pressure, as operating in nature, will be the governing ones to approximate in the successful experiments along this line.

"One handicap to such experiments will be that many who begin them will do so without proper appreciation of the fact that natural gas, like its denser associate, petroleum, is a mixture of hydrocarbons. By reference to any text book touching the subject it will be seen that the bubbles arising from decaying vegetation in swamps and stagnant pools is called methane, or marsh gas, a hydrocarbon representing the lightest form of natural gas, and forming the first of what is termed the methane series. The chemists explain that in the composition of this gas each atom of carbon unites with four of hydrogen.

"If this composition is added to in the proportion of 1 atom of carbon to 2 of hydrogen it is lowered to the next number of the series, called ethane. By another addition of carbon and hydrogen in the proportion named it is dropped to the third member of the series, called propane, and so on, through additions in this regular proportion it descends in the series from lighter gas to heavier gas, from gas to vapors, and from vapors of increasing density down into petroleum. The fourth drop in the addition of carbon and hydrogen in the proportion above noted is called butane, and with the other three named constitutes the first four members of the series defined as the gases. The production of a gas well may be chiefly of one member of this series, or it may be a mixture of several or all of them, and when this is taken into account, together with the fact of the distinction to be made between the gases as such and oil vapors, it is a plausible surmise that many of the experiments referred will be misapplied and productive of premature conclusions. All the gases will become liquid under sufficient cold or pressure, but the degree of either of these necessary to produce the change is not a slight one. For example, one authority consulted on the subject states that the lightest of the gases, methane, liquefies at 263° below zero, under atmospheric pressure, or at a pressure of 2,700 pounds to the square inch at 12° F. We have not found any authority to warrant the assertion that this gas will produce any liquid above the degree of temperature or pressure named, but venture the guess that any gas containing carbon, whether called a dry gas or not, carries some liquid hydrocarbons, though the proportion may be small in the lightest gas, and not practical commercially to recover. However, it is with the heavier gases and vapors from oil wells with which the experiments in progress and in prospect will chiefly deal, and by which we believe much gasoline will be saved which otherwise would be carried off and lost in evaporation."

From the inquiries and reports lately received the prediction ventured in the above may now be made stronger and the opinion expressed that at least one of the next special developments in relation to the oil and gas business will be the extent to which means are applied, both through small plants and large ones, in collecting gasoline from the sources named. The only making of gasoline along these lines which the *Petroleum Gazette* has directly investigated has been where gas pumps have been employed in operating oil wells, and where the process has been the simple one of chilling the gases or oil vapors after they have been heated in passing through the gas pumps.

Other instances are reported in which certain processes of compression are added to this method, utilizing both gases and vapors, but the *Petroleum Gazette* has not had the opportunity as yet to witness any of such instances and therefore cannot vouch for them. Though having only seen it demonstrated thus far that it is practical to obtain gasoline where gas pumps are employed, we do not believe that process to define the limits of possibility for obtaining it. The largest output we have heard of for any one of these gasoline making plants is 10 barrels a day. While they are all of small individual output they have much room in which to multiply and we credit them accordingly as representing a development in the business that is destined to have an important growth.

1. *Petroleum Gazette.*

Flow of Steam Through Pipes and from a Given Orifice.

The following is taken from "Steam," a book published by the Babcock & Wilcox Co., the well known manufacturers of the Babcock & Wilcox boiler, which contains a fund of information on steam.

Flow of Steam Through Pipes.—The approximate weight of any fluid which will flow in 1 minute through any given pipe with a given head or pressure may be found by the following formula:

$$W = 300 \sqrt{\frac{D\,(P_1 - P_2)\,d^5}{L\,(1 + \frac{3.6}{d})}}$$

in which W = weight in pounds avordupois, d = diameter in inches, D = density or weight per cubic foot; p, the initial pressure, p_1 pressure at end of pipe, and L = length in feet.

The following table gives, approximately, the weight of steam per minute what will flow from various initial pressures, with 1 pound loss of pressure throught straight, smooth pipes, each having a length of 240 times its own diameter:

TABLE OF FLOW OF STEAM THROUGH PIPES.

Initial pressure by gauge, lbs. per sq. in.	Diameter of Pipe in inches. Length of each=240 diameters.													
	¾	1	1½	2	2½	3	4	5	6	8	10	12	15	18
	Weight of steam per minute in pounds, with one pound loss of pressure.													
1	1.16	2.07	5.7	10.27	15.45	25.38	46.85	77.3	115.9	211.4	341.0	502.4	804	1177
10	1.44	2.57	7.1	12.72	19.15	31.45	58.05	95.8	143.6	262.0	422.8	622.5	996	1458
20	1.70	3.02	8.3	14.94	22.49	36.94	68.20	112.6	168.7	307.5	496.5	731.3	1170	1713
30	1.91	3.40	9.4	16.84	25.35	41.63	76.84	126.9	190.1	346.8	559.8	824.1	1318	1930
40	2.10	3.74	10.3	18.51	27.87	45.77	84.49	139.5	209.0	381.3	615.3	906.0	1450	2122
50	2.27	4.04	11.2	20.01	30.13	49.48	91.34	150.8	226.0	412.2	665.0	979.5	1567	2294
60	2.43	4.32	11.9	21.38	32.19	52.87	97.60	161.1	241.5	440.5	710.6	1046.7	1675	2451
70	2.57	4.58	12.6	22.63	34.10	56.00	103.37	170.7	255.8	466.5	752.7	1108.5	1774	2596
80	2.71	4.82	13.3	23.82	35.87	58.91	108.74	179.5	269.0	490.7	791.6	1166.1	1866	2731
90	2.83	5.04	13.9	24.92	37.52	61.62	113.74	187.8	281.4	513.3	828.1	1219.8	1951	2856
100	2.95	5.25	14.5	25.96	39.07	64.18	118.47	195.6	293.1	534.6	862.6	1270.1	2032	2973
120	3.16	5.63	15.5	27.85	41.93	68.87	127.12	209.9	314.5	573.7	925.6	1363.3	2181	3195
150	3.45	6.14	17.0	30.37	45.72	75.09	138.61	228.8	343.0	625.5	1009.2	1486.5	2378	3481

For sizes of pipe below 6-inch, the flow is calculated from the *actual* areas of "standard" pipe of such nominal diameters.

For horse power, multiply the figures in the table by 2. For any other loss of pressure, multiply by the square root of the given loss. For any other length of pipe, *divide 240 by the given length expressed in diameters, and multiply the figures in the table by the square root of this quotient*, which will give the flow for 1 pound loss of pressure. Conversely dividing the given length by 240 will give the loss of pressure for the flow given in the table.

The loss of head due to getting up the velocity, to the friction of the steam entering the pipe, and passing elbows and valves, will reduce

the flow given in the tables. The resistance at the opening, and that at a globe valve, are each about the same as that for a length of pipe equal to 114 diameters divided by a number represented by 1 + (3.6 ÷ diameter). For the sizes of pipes given in the table, these corresponding lengths are:

¼	1	1½	2	2½	3	4	5	6	8	10	12	15	18
20	25	34	41	47	52	60	66	71	79	84	88	92	95

The resistance at an elbow is equal to ⅔ that of a globe valve. The equivalents for opening for elbows, and for valves, must be added in each instance to the actual length of pipe. Thus a 4-inch pipe, 120 diameters (40 feet) long, with a globe valve and 3 elbows, would be equivalent to 120 + 60 + (3 × 40) = 360 diameters long; and 360 ÷ 240 = 1½. It would therefore have 1½ pounds loss of pressure at the flow given in the table, or deliver (1 ÷ $\sqrt{1\frac{1}{2}}$ = .816), 81 6 per cent. of the steam into the same (1 pound) loss of pressure.

Flow of Steam from a Given Orifice.—Steam of any pressure flowing through an opening into any other pressure, less than three-fifths of the initial, has practically a constant velocity, 888 feet per second, or a little over 10 miles per minute; hence the amount discharged in pounds is proportionate to the weight or density of the steam. To ascertain the pounds, avoirdupois, discharged per minute, *multiply the area of opening in inches by 370 times the weight per cubic foot of the steam.*

Or the quantity discharged per minute may be approximately found by Rankine's formula. $W = 6\,a\,p \div 7$, in which W = weight in pounds, a = area in square inches, and p = absolute pressure. The theoretical flow requires to be multiplied by $k = 0.93$ for a short pipe, 0.63 for a thin opening, as in a plate or a safety valve. Where a steam flows into a pressure more than ⅔ the pressure in the boiler:

$W = 1.9\,a\,k\,\sqrt{(p - (\delta)\,\delta}$; in which δ = difference in pressure between the two sides, in pounds per square inch, and a, p and k as above. To reduce to horse power, multiply by 2.

Where a given horse power is required to flow through a given opening to determine the necessary difference in pressure—

$$\delta = \frac{p}{2} - \sqrt{\frac{p^2}{4} - \frac{H.P.^2}{14\,a^2 k}}$$

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, May 10th, 1907.

Municipal and Private Enterprise.—Another Innovation from Baron von Welsbach.—The Irish International Exhibition.

At a recent meeting of a District Gas Engineers' Association held at Lincoln, a city which happens to own the gas undertaking of the district, a paper was read which has had the effect of directing attention once more to this much disputed question, although it does not contribute anything to the main factors involved. Because municipal ownership can show satisfactory results, it does not necessarily follow that the principle is sound, or because the average municipality sells gas at a trifle less price than the average company, that the management is necessarily more skilled or more economical. Yet this was the sum and substance of the arguments advanced. One of the advantages claimed by the advocates of municipal ownership is something similar to those of the Building Societies who offer to enable any occupier to become the owner of his house at any outlay not exceeding the sum annually paid as rent. It is contended that the sums at present pocketed by the shareholders in the form of dividends, could be devoted towards paying off the capital. And hence we have the anomaly that while joint stock, gas or water companies are expressly forbidden from applying their funds to the liquidation of capital, directly the concern passes over to the municipal authorities, a sinking fund is formed for the redemption of the capital within a certain period of years. When the capital charge is liquidated, or nearly so, the consumer is to have cheaper gas. But now, although many of the public undertakings have been able to write off a large portion of their capital, it is difficult to show any substantial advantage secured to the consumer or to the ratepayer as compared with that which would obtain if the concern had remained in the hands of a private company. The price argument, too, is disingenious in this respect. It is only the best and most prosperous undertakings, situated where coal is cheap and other circumstances are favorable, that are brought up. Where coal is dear and business slow, the company are not disturbed by offers to purchase. So it is quite as unjust to compare municipal and private average selling prices, as it would be to pick out a selection of large favorably situated companies, take their average selling price, and then compare it with the average of the remainder. The success of any trading undertaking, whether conducted by public, joint stock, or individual enterprises, is dependent upon the amount of skill put into it by the officials and board of management. And the system that in the long run will be the most successful is the one that offers the greatest encouragement to all the employees from the highest to the lowest, to perfect themselves in their respective departments, and to develop all possible resources and generally to render the best possible service. It is the one that picks out the best available talent for the board room, and that retains it as long as possible. I have yet to learn that municipal enterprises offer any advantages in these respects, and will go further and say that it is not in harmony with them. No one possessed of general knowledge or experience would recommend a competent, energetic young beginner to seek service with a local authority rather than with a private company, as a means of securing the best recognition and reward for his merits. If by luck rather than skill the municipality secure a good chairman and working committee, what guarantee is there that they will not be opposed and possibly turned out of office at the end of the year, from political or religious motives, blind prejudice, or all sorts of outside issues? It would be easy to instance engineers and managers of municipal undertakings, who are continually being hampered, harassed and worried from motives entirely outside of and disconnected with their proper business, or excellent committeemen who have been attached and deposed by the opposite party. Nothing of this sort obtains in the case of private companies. One would also like to see some substantial benefit to the ratepayer from the profits on trade, not in the form in which it is usually presented, of so many thousands of pounds paid into the borough funds, but as a reduction of the rating assessment. What benefit is it to the average ratepayer if the profits on the gas or water undertaking are £50,000 a year, but the rates are about as high as in other districts. Yet the authority that dips deepest into trading undertakings is not the one that shows the lowest assessment in the £. Two points are apt to be forgotten in this connection. The first is, that the public company is usually assessed up to the hilt—and in effect hands over a substantial share of its profits to the municipal exchequer by means of the rate collector. Many gas companies dispose of one-third or more of their actual profits in this way, but the municipal gas works does not pay in anything approaching such a proportion. And the second is that when the undertaking is in the hands of a private company, the local authority can act as representatives of the consumers. When the company goes to Parliament for extended powers the local authority are sure to be in evidence with demands for restrictions of price or of rates of dividend, and limitations as to quality and purity of the gas, and the company have to buy off their opposition by very substantial and valuable concessions in these respects. But when the municipality go to Parliament there is no representative of the consumers, with the result that the interests of the ratepayers are considered, but all that the consumer gets is a promise that the price and quality shall remain as heretofore.

A gas self-lighter, that is, an arrangement that secures the ignition of the gas whenever the tap is turned on, is not altogether a novelty. During the last few years various more or less ingenious devices have been put on the market and some have attained to a fair share of success. They are all based on the fact that platinum or platinum oxide, when exposed to a current of hydrogen, acquires an incandescent temperature. But coal gas only runs to about 50 per cent. of pure hydrogen, and some of the other constituents do not assist the process. The platinum pellet or filament is small and delicate, and while it can be kept in order for months at a time in the laboratory, it will not stand the ordinary usage of everyday life. The platinum is easily upset by draught, dust or damp, and if it is sluggish in action there may be annoyance from the smell of escaping gas, and a more or less decided explosion when ignition does occur, producing a small cloud of soot. The user also objects to wait a minute or more for the lighting up. A self-lighter on a new principle was exhibited at the Royal Institution, and not the least interesting feature was that the inventor is Baron von Welsbach, of incandescent mantle fame. This illustrious scientist has discovered a compound of iron and cerium that possesses the property of giving sparks of sufficient intensity to ignite gas on being slightly scraped. The self-lighter is a simple mechanical device attached to the tap, by which the action of turning on the tap also strikes a spark and lights the gas. If the Baron can perfect this device and put it on the market in a cheap and efficient form, at the same time

avoiding the mistakes which greatly hampered the extended use of the mantle, and if at the same time he can strengthen the fabric of the mantle as at present used, he will attain a position second to none amongst the pioneers of our industry.

I have already remarked that the meeting of the Institution of Gas Engineers is to be held at Dublin this year, one inducement to the selection of the Irish capital at this time being the Irish International Exhibition, which was opened last week by the Lord Lieutenant of Ireland. The Exhibition Buildings cover more than 50 acres of grounds, and amongst numerous other attractions includes a gas pavilion of very substantial proportions in which are to be found some 25 stalls, the contents of which afford a fair representation of the present state of our industry. In addition to this, there are extensive displays of inside and outside gas lighting in various parts, comprising nearly 300 lamps of 1,500-candle power each. One misses some well-known names from the list of exhibitors. For one thing in an exhibition of a general character the available space is limited. Then there is the question of distance, and the prospect of the Manchester Exhibition coming on in the autumn. But the gas pavilion is in no sense inadequate to the position and the magnitude of the industry, and does credit to the energy and enterprise of Mr. F. R. Cotton, Manager of the Dublin Gas Company, who has undertaken the organization of the gas section. Naturally in a popular exhibition the preference is given to household appliances, such as various designs for lighting, warming and cooking apparatus. The Dublin Gas Company in conjunction with a firm of furniture manufacturers show a suite of five luxuriously appointed apartments filled with the latest improvements. Makers of burners and lamps are well represented, gas fires and cookers are of course well in evidence, and there are over half a dozen stands containing photographs or models of modern gas works apparatus, specimens of fireclay crude and finished, apparatus for mechanical transport, tubes and so on. The chief novelties in the lighting department are in connection with the inverted incandescent burner, self-lighting apparatus and high pressure lighting, not forgetting the application of the inverted burner for street lighting. It is evident that the inverted system is increasing in popularity and will rapidly acquire a very important position. Following the lead of the successful stall at Earls Court there is a stand illustrating the whole process of manufacturing incandescent mantles from the raw materials up to the finished articles.

The ever attractive glass cased meter is also to be seen and the claims of history are not overlooked, as represented by meters made nearly 70 years ago and by a 1,000-light meter that is still hale and hearty after 35 years' working service. So it is evident, not only that a satisfactory showing on behalf of coal gas has been arranged, in the popular sense, but that visitors to Dublin next month will be afforded valuable and profitable occupation for the time—all too short in most cases—that can be spent in the very interesting city. But it must not be supposed that visitors to the Institution meeting will have no attraction beyond the exhibition. The Council of the Institution, under the capable and experienced guidance of the President, Mr. Chas. Hunt, have arranged for no less than nine papers, exclusive of a lecture by Prof. Lewes, and the usual address. The list of authors is a strong one. It includes Mr. Paul Schlight, of New York, and Mr. R. M. Searle, Rochester, N. Y., Mr. F. W. Goodenough, of the Gas Light and Coke Company, London, and Mr. H. F. Maybury, County Surveyor for Kent. Three papers are in connection with coke ovens, one deals with the use of tar for roadways, and the remainder with the commercial end, or matters connected with the consumption of gas. It is evident that visitors who expect to do full justice to the proceedings at the meeting as well as the attractions of the Exhibition will have to lay themselves off for at least a week active employment, and this leaves no margin for the historical and other attractions afforded by the city and neighborhood.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE annual meeting of the Denver (Col.) Gas and Electric Company, which was to have been held the 14th inst., was postponed, owing to the absence of prominent New York residents.

THE rearrangement and extension of the distributing mains of the Greenfield (Mass.) Gas Light Company, which includes the extension of the system to Turner's Falls, will be carried out by the Harrison Construction Company, of Newark, N. J. By next fall the Company will have put in at least 15 miles of new pipe.

THE Hartford City (Conn.) Gas Light Company will send gas into Thompsonville by and through an arrangement with the Northern Connecticut Light and Power Company.

THE Directors of the Fitchburg (Mass.) Gas and Electric Light Company have made a voluntary reduction of 20 cents per 1,000 cubic feet in the selling rate, the concession to become effective the 1st prox. This makes the net rate (20 days are allowed for the settlement of accounts) equal $1.25 per 1,000.

IT has often caused comment that there is not a gas supply in the village of Babylon, L. I. Although Babylon has a population of not less than 4,000, and holds within it many beautiful homes that are occupied virtually the year round, and although gas is made and sold in Bay Shore to the East and at Freeport on the West, the pipes never got to or through about the prettiest summering spot on Great South Bay. However, this may account for it: The President of the village is also President of the local electric lighting concern.

AT the annual meeting of the Port Huron (Mich.) Gas Company the following officers were elected: Directors, J. T. Lynn, T. H. Eaton, J. B. Book, A. D. Bennett, J. C. Sloan, P. H. Phillips and L. A. Sherman; President, J. T. Lynn; Vice-President, A. D. Bennett; Secretary, J. B. Book; Treasurer, T. H. Eaton.

WITH much regret we report the death of Mr. William Kiefer Callahan, prominent on the Board of Directors of the Dayton (O.) Gas Light and Coke Company. He was in his 44th year, having been born in Dayton, January 3, 1884. He is survived by a daughter.

A VERY successful gas range cooking demonstration was made a fortnight ago in Marshall, Mich., under the direction of the Marshall Light, Heat and Power Company. The lecturer was Mr. Charles E. Draper. This course developed one fact that has an odd "business-stroke" about it. The Marshall Company is one of several controlled by the National Light, Heat and Power Company, and the Manager thereof, in dickering with the stove manufacturers for the National's stove needs for 1907, eventually made a dicker with a certain stove concern who, as a part of the bargain, agreed to have Mr. Draper deliver a course of demonstration lectures in each of the centers where the purchasers operated a gas works.

A CORRESPONDENT in St. Paul writing under date of the 16th inst., incloses the following: "Mr. H. J. Gillie, Manager of the Commercial Department of the St. Paul Gas Light Company, and who has been with the Company in different capacities for the past 9 years, leaves the St. Paul field next Saturday, to assume the duties of Commercial Manager of the General Electric Company in Minneapolis, Minn. He first became connected with the St. Paul Company in 1898. Mr. Gille is prominent in the gas and electrical fields, and his friends and admirers in St. Paul are regretting over losing him, even though wishing him success in his new field. He has been longer identified with the electrical interests of St. Paul than anyone now active therein in the saintly half of the Twin City. In fact Mr. Gille, in conjunction with Dr. A. W. Miller constructed the first alternating current dynamo built in Minnesota. Despite his wide experience he is young in years, having been born in Stillwater, 37 years ago.

A CORRESPONDENT in Chattanooga, writing under date of the 16th inst., and referring to the Khorassan Carnival then in progress there, says: "The Chattanooga Gas Company, always up-to-date, is making the only private exhibit on the Khorassan Carnival grounds. True to its philanthropic ideas, the Gas Company has installed in the women's pavilion a gas range upon which all the lunches sold by this concern are cooked. The inside lights of the 'Country Store' are also furnished by the Gas Company as are the outside arc gas lights. This display is purely a donation to the ladies in charge, and after the Carnival has come to an end the range now in use by them is to be sold and the proceeds donated by the Gas Company to the Highland Park Methodist church. At the main entrance gate are located 14 arc lights, of a combined candle power of 6,200. This is donated also, by the Gas Company, to the Knights of Khorassan in appreciation of the good this order is doing in upbuilding the social life of the city and the advertising that they have caused to be done in the interest of Chattanooga."

A MEASURE recently passed by the Massachusetts Senate permits the consolidation of the Webster Electric and the Southbridge Gas Companies.

THE Legislature of Connecticut has ordered that the decision as to who shall put gas into Southington, Conn., shall be remitted to the residents for balloting in special election, The Meriden Company and the Wallingford Company seem anxious to assume that task.

MR. LOUIS N. RANCKE informs us that the Baltimore (Md.) Retort and Firebrick Company has been awarded a contract for the construction of 2 benches of 6's, half depth, rear-clinkering type, on the works of the City Gas Light Company, of Norfolk, Va. In fact, the benches will be ready for firing by July 15th.

THE Gas Bench Construction Company, of St. Louis, Mo., is under contract to construct 5 new benches of full depth 9's, to the order of the Kentucky Heating Company, of Louisville, Ky., and also 3 benches of 6's for the Cadillac Gas Light Company, of Cadillac, Mich.

AT the annual meeting of the South Jersey Gas and Electric Company held in Camden, the 15th inst., the officers elected were: Directors, D. Baird, T. C. Barr, Frank Bergen, J. H. Blackwell, F. O. Briggs, F. F. Dryden, A. R. Kuser, T. N. McCarter, U. H. McCarter and W. J. Thompson; President, A. R. Kuser; Vice-President, John J. Burleigh; Secretary, Fred. Evans; Treasurer, C. G. Cook.

THE petition of the Greenfield (Mass.) Gas Light Company for an extension of its privileges under which it will obtain the right to extend its mains to and through the town of Montague is being considered by the Board of Gas and Electric Light Commissioners. There is no doubt that consent will be given, for the residents of Montague are very anxious that a gas supply should be afforded them.

MR. EDWARD A. PEEBLES has been appointed Superintendent of the North Adams (Mass.) Gas and Electric Light Company.

THE contract for the remodelling of the works of the Chattanooga (Tenn.) Gas Company has been awarded to the American Gas Equipment Company, of New York. The money involved is $100,000.

MR. M. N. DIALL, since 1872 Manager of the Terre Haute (Ind.) Gas Company, was asked to resign that position shortly after the plant was acquired by the New York Gas and Electric Company. He refused on the ground that he was elected last year to serve as Manager until July 2d. The new owners then ordered Mr. Diall's dismissal and he brought suit for an order restraining his removal until the day named, which order was granted. This is a queer mess on both sides. The Company certainly could have well waited until July 2d, and Mr. Diall could surely have left unsaid some (yes, many) things uttered by him in his complaint and subsequent to the decision thereon. Some of the folks connected with the succeeding Company are to a surety plentifully endowed with "executive ability."

MR. E. L. HOSPES, formerly State Senator from the Stillwater district of Minnesota, has resigned the Presidency of the Stillwater Gas and Electric Light Company. Mr. B. S. Davis has also resigned from the Company's Board of Directors.

THE Boston Consolidated Gas Company has sold to Messrs. Lumsden & Van Stone the property owned by it on West First street, South Boston. The strip extends out to the reserved channel.

LAST Monday, Judge Colt, of the United States Circuit Court, ordered a temporary injunction to issue in the suit of the Haverhill (Mass.) Gas Light Company against Attorney-General Malone and the Board of Gas and Electric Light Commissioners, restraining the defendants from enforcing an order of the Commissioners reducing the price of gas from $1 to 80 cents in Haverhill. The order was made in 1900, and lately the Attorney-General has brought proceedings in the State Court to enforce it. The Company questions the constitutionality of the order and intends to have the Supreme Court pass on it. Meantime the Attorney-General will not prosecute his action in the State Court. The Company has filed a bond for $25,000 so as to secure the consumers should the Court ultimately determine the order to be constitutional, in which event the Company would refund to them the excess of 80 cents. The Company contends the reduction was unreasonable and vitually amounted to a confiscation of its property.

THE following is the official price pronunciamento recently issued to the residents of Oshkosh, Wis., by the proprietors of the Oshkosh Gas Light Company: "From June 1st, 1907, until further notice, the discount on illuminating gas to those paying at the Oshkosh Gas Light Company's office on or before the 10th day of the month, will be 50 cents per 1,000 feet, instead of the present discount of 25 cents per 1,000, making the net price for prompt payment $1.25 per 1,000." This is a concession on illuminating account use of 25 cents per 1,000. President Sawyer usually keeps his word, as the above carries out his promise made last fall that a concession would be made at the earliest possible moment. The net rate for fuel remains at $1 per 1,000.

CLAY CENTER, KAS., is anxious to have a gas works.

THE Meridian Light and Railway Company, of Meridian, Miss., has planned a comprehensive scheme of construction that means an expenditure of $60,000. General Manager Patterson declares that the betterments will be completed by September 1st.

MR. FRED. RUSCHAUFT has been appointed Gas Inspector for Milwaukee, Wis., vice Prof. A. S. Mitchell, resigned.

THE following is from a recent issue of the Augusta (Ga.) *Herald:* "The Augusta Gas Company is planning great improvements which will be made this summer, and, according to authentic information, the service which will be maintained here under the new *regime* will be a great improvement over the system now in use. The main improvement will be made in the construction of a 500,000-cubic foot gasholder which will cost alone $40,000, and other improvements under consideration will represent an outlay of more than $100,000. The holders will be of the most modern type and new purifying boxes will be added to the plant. A new exhauster will be another feature to be put in the new improved system. The distribution system will be conducted along improved lines, and an 8-inch main will be laid along Campbell street. Many other distributing lines will be put down. The work will begin as early as possible and the plan for the work will be mapped out as rapidly as it can be done."

ACCORDING to City Engineer Fisher, the tests for illuminating power of the gas supplied at Rochester, N. Y., as made by Mr. J. E. Putnam, for city account, the candle power for the named periods showed as follows: Feb., 21; March, 20.8; April, 20.9.

MR. JNO. FREISHON, Superintendent of the manufacturing division of the Citizens Gas and Fuel Company, of Terre Haute, Ind., since 1897, has resigned from its service. He was and is a capable man.

AT the annual meeting of the Carlisle (Pa.) Gas and Water Company Mr. L. R. Brenemann was elected a Director, succeeding Mr. I. W. Henderson.

AFTER June 1st the net gas rate at Rockford, Ills., will rule at $1.10 per 1,000 cubic feet, although under its charter the Rockford Gas and Electric Company has the right to charge $1.25 for several years to come.

THE selling rate at Naugatuck, Conn., has been reduced to $1.25 per 1,000 cubic feet.

MR. CARL STEINWEDELL has been appointed Superintendent of the Columbus (O.) Gas and Fuel Company's artificial gas plant. He succeeded Mr. W. M. Powell, who will take charge of the Company's new business department.

THE Suburban Gas Company, of Philadelphia, has notified the holders of the mortgage bonds bearing date of 1902 that it will receive tenders for same sufficient to absorb the sum of $16,250, in accordance with the terms of the sinking fund relating thereto. Tenders should be made to the Real Estate Trust Company, of Philadelphia, and the time for receiving same will cease at the close of banking hours, the 31st inst.

THE Nyack (N. Y.) Gas Light and Fuel Company will largely add to its distributing system this summer.

THE old artificial gas plant, which was built in New Castle, Ind., by Mr. H. F. Miller in the early 80's, is being dismantled.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 42 Pine Street, New York.
Telephone, 2996 John.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance.
Single copies, 10 cents.

The JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

MONDAY, MAY 27, 1907.

The Market for Gas Securities.

The news respecting the decision of Referee Masten, in respect of the proceedings to nullify the 80-cent gas law, sent Consolidated up with a rush early in the week, and to-day (Friday) it sold as low as 125, without any reason whatever for the slump. The referee's decision will in all human probability be confirmed by the appointing Court, and to us it looks that Consolidated should be selling at 175 instead of 125.

Brooklyn Union is 120 bid, whereas it is in reality worth 150, even with gas at 80 cents per 1,000. It has the business, although its plant might be in better shape. Peoples, of Chicago, is 90⅛ bid, and Massachusetts gas is offered at 60½.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MAY 27.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	122	125
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	101	104
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	..	105
Mutual	3,500,000	100	190	205
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	98	100
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p.ct.	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	101	103
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	108	111
Con. 5's, due 1945, J. & J.	1,500,000	..	104	110
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
1st Mtg. 5's, due 1930, M. & N	1,500,000	1,000	104	108
The Brooklyn Union	15,000,000	1,000	115	120
1st Con. 5's, due 1948, M. & N	15,000,000		107	..
Yonkers	299,550	500	130	..
Out-of-Town Companies.				
Bay State	50,000,000	50	¼	⅝
" Income Bonds	2,500,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	83	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	9	10
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106½
Cincinnati Gas and Electric Co.	29,500,000	100	98	98½
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	87	88
Preferred	3,095,500	100	107½	108
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	.	90
Mortgage, 6's	3,500,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	3,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
Bonds, 5's	10,500,000	..	107½	108½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,550,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,823,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	05
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind	1,000,000	100	..	60
Bonds	1,000,004	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Massachusetts Gas Companies of Boston	25,000,000	100	60	60¼
Preferred	25,000,000	100	83	83¼
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	90⅝	90¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
" 2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	85	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	100	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	2,465,000	1,000	96¼	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,500,000	20	300	305
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	230	..

Advertisers' Index.

GAS ENGINEERS.

	Page
A. E. Boardman, New York City	905
Baxter & Young, Detroit, Mich	914
B. E. Chollar, St. Louis, Mo	908
Cruse-Kemper Co., Philadelphia, Pa	904
Davis & Farnum Mfg. Co., Waltham, Mass	916
Economical Gas Apparatus Construc'n Co., Toronto, Ont	915
Frank D. Moses, Trenton, N. J	918
Frederic Egner, Norfolk, Va	920
H. M. Byllesby & Co., Chicago, Ills	908
Humphreys & Glasgow, New York City	916
Isbell-Porter Co., Newark, N J	904
Kerr Murray Mfg. Co., Fort Wayne, Ind	917
Practical Gas Construction Co., North Chicago, Ills.	916
The Gas Machinery Co., Cleveland, O	900
The Jeffrey Manufacturing Co., Columbus, O	914
United Gas Improvement Co., Philadelphia, Pa	916
Western Gas Construction Co., Fort Wayne, Ind	924

GAS WORKS APPARATUS AND CONSTRUCTION.

A. E. Boardman, New York City	905
Bartlett, Hayward & Co., Baltimore, Md	917
Baxter & Young, Detroit, Mich	915
Connelly Iron Sponge & Governor Co., New York City	913
Continental Iron Works, Brooklyn, N. Y	918
Cruse-Kemper Co., Philadelphia, Pa	904
Davis & Farnum Mfg. Co., Waltham, Mass	916
Deily & Fowler, Philadelphia, Pa	920
Economical Gas Apparatus Construc'n Co., Toronto, Ont.	915
Frank D. Moses, Trenton, N. J	918
Humphreys & Glasgow, New York City	916
Isbell-Porter Company, New York City	904
Kerr Murray Mfg. Co., Fort Wayne, Ind	917
Lloyd Construction Co., Detroit, Mich	905
Logan Iron Works, Brooklyn, N. Y	920
Quintard Iron Works, New York City	916
R. D. Wood & Co., Philadelphia, Pa	918
Riter-Conley Mfg. Co., Pittsburgh, Pa	919
Stacey Mfg. Co., Cincinnati, O	919
The Gas Machinery Co., Cleveland, O	900
The Jeffrey Manufacturing Co., Columbus, O	914
United Gas Improvement Co., Philadelphia, Pa	911
Western Gas Construction Co., Fort Wayne, Ind	924

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md	917
B. E. Chollar, St. Louis, Mo	908
Economical Gas Apparatus Construc'n Co, Toronto, Ont.	915
Humphreys & Glasgow, New York City	916
Semet-Solvay Co., Syracuse, N. Y	914
The Gas Machinery Co., Cleveland, O	900
United Gas Improvement Co., Philadelphia, Pa	911
Western Gas Construction Co., Fort Wayne, Ind	924

SCRUBBERS AND CONDENSERS.

Continental Iron Works, Brooklyn, N. Y	918
Cruse-Kemper Co., Philadelphia, Pa	904
Davis & Farnum Mfg. Co., Waltham, Mass	916
Economical Gas Apparatus Construc'n Co., Toronto, Ont	915
Isbell-Porter Co., Newark, N. J	904
Kerr Murray Mfg. Co., Fort Wayne, Ind	917
Logan Iron Works, Brooklyn, N. Y	920
R. D. Wood & Co., Philadelphia, Pa	918
Riter-Conley Mfg. Co., Pittsburgh, Pa	919
Stacey Mfg. Co., Cincinnati, O	919
The Gas Machinery Co., Cleveland, O	900
Western Gas Construction Co., Fort Wayne, Ind	924

PRODUCER POWER PLANTS.

Economical Gas Apparatus Construc'n Co., Toronto, Ont.	915
R. D. Wood & Co., Philadelphia, Pa	918

TAR AND CARBONIC ACID EXTRACTOR.

Economical Gas Apparatus Construc'n Co., Toronto, Ont.	915
Isbell-Porter Co., Newark, N. J	904
Kerr Murray Mfg. Co., Fort Wayne, Ind	917
Stacey Mfg. Co., Cincinnati, O	919
The Gas Machinery Co., Cleveland, O	900
Western Gas Construction Co., Fort Wayne, Ind	924

AMMONIA CONCENTRATORS.

Michigan Ammonia Works, Detroit, Mich	898
The Gas Machinery Co., Cleveland, O	900
Western Gas Construction Co., Fort Wayne, Ind	924

GAS METERS.

American Meter Co., New York and Philadelphia	923
Detroit Meter Company, Detroit, Mich	923
D. McDonald & Co., Albany, N. Y	921
Helme & McIlhenny, Philadelphia, Pa	923
John J. Griffin & Co., Philadelphia, Pa	880
Keystone Meter Co., Royersford, Pa	922
Maryland Meter and Mfg. Co., Baltimore, Md	922
Metric Metal Co., Erie, Pa	923
Nathaniel Tufts Meter Co., Boston, Mass	922
New York Improved Meter Co., New York City	922
Pittsburg Meter Co., East Pittsburg, Pa	921
Rotary Meter Co., New York City	899
United States Meter Co., Brooklyn, N. Y	908

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia	923
D. McDonald & Co., Albany, N. Y	921
Helme & McIlhenny, Philadelphia, Pa	923
John J. Griffin & Co., Philadelphia, Pa	880
Keystone Meter Co., Royersford, Pa	922
Nathaniel Tufts Meter Co., Boston, Mass	922
New York Improved Meter Co., New York City	922
Pittsburg Meter Co., East Pittsburg, Pa	920

PREPAYMENT METER ATTACHMENTS.

New York Improved Meter Co., New York City	922
Reeves Mfg. Co., New Haven, Conn	919

WATER METERS.

Pittsburg Meter Co., East Pittsburg, Pa	921

GAS AND WATER PIPES.

Davis & Farnum Mfg. Co., Waltham, Mass	906
Donaldson Iron Co., Emaus, Pa	908
Economical Gas Apparatus Construc'n Co., Toronto, Ont.	915
R. D. Wood & Co., Philadelphia, Pa	918
Warren Foundry and Machine Co., New York City	908

GAS COALS.

Berwind-White Coal Mining Co., New York and Phila. 914
Perkins Co., New York City..... 914
Westmoreland Gas Coal Co., Philadelphia, Pa 915

SPECIALTIES FOR OIL AND PIPE LINES.

S. B. Dresser, Bradford, Pa..... 912

GAS MAIN STOPPERS.

Safety Gas Main Stopper Co., New York City..... 908

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y..... 914

GAS TAPPING MACHINES.

George Light, Dayton, O..... 908
H. Mueller Manufacturing Co., Decatur, Ills..... 898

CANNEL COALS.

Perkins & Co., New York City..... 914

STOKING MACHINERY.

G. A. Bronder, New York City..... 913

CONVEYORS.

Cruse-Kemper Co., Philadelphia, Pa..... 04
C. W. Hunt Company, New York City..... 905
Economical Gas Apparatus Construc'n Co., Toronto, Ont 915
G. A. Bronder, New York City..... 913
Kerr Murray Mfg. Co., Fort Wayne, Ind 917
The Gas Machinery Co., Cleveland, O..... 900
The Jeffrey Manufacturing Co., Columbus, O..... 914
Western Gas Construction Co., Fort Wayne, Ind..... 904

CHARGING BARROWS & COAL WAGONS.

Davis & Farnum Mfg. Co., Waltham, Mass..... 916
Kerr Murray Mfg Co., Fort Wayne, Ind..... 917
Stacey Mfg. Co., Cincinnati, O..... 919

GAS ENRICHERS.

Standard Oil Co., New York City. 915
The Sun Oil Co., Pittsburgh, Pa..... 915

COKE CRUSHERS.

C. M. Keller, Columbus, Ind. 915
The Jeffrey Manufacturing Co., Columbus, O..... 914

(*Continued on page 898.*)

DIVIDEND NOTICE.

OFFICE OF THE AMERICAN GAS COMPANY,
222 S. THIRD ST., Philadelphia, Pa., May 21, 1907.

The Board of Directors of The American Gas Company has this day declared a semi-annual dividend of 3 per cent., or $3 per share, on the capital stock of the Company, payable June 1st, 1907, to stockholders of record on May 21, 1907, at 3 P.M. Transfer books close May 21, 1907, and re-open June 2, 1907. Checks will be mailed.

1 68-1 WALTER GODLEY, Treasurer.

Estimates furnished for the erection of complete gas works or the extension and modernizing of old works. All work warranted. Both water gas and coal gas.

EMPIRE GAS IMPROVEMENT & CONSTRUCTION COMPANY,
1038-tf 49 Wall Street, New York

Position Wanted
AS A GAS MAKER
(Now Employed in a Large Plant)

By a young man with 10 years' practical experience (water gas); can run engine and familiar in everything where steam is used; has solicited, read meters, laid pipes and put up gas stoves; can do mostly anything around a small plant.

16 8-1 Address, "GENERATOR," care this Journal.

Position Wanted.

The advertiser, who is 35 years of age and married, desires a position with a company that needs the services of a man competent in every sense to take charge of its distribution department. Thoroughly up in drafting, and can take entire charge of its service and meter divisions. Refers by permission to Mr. C. H. Dickey, Maryland Meter Co., Baltimore, Md.

16 8-2 Address, "J. O. J.," Care this Journal.

Position Wanted.

A Capable Manager and Superintendent,

Now employed, desires a position as manager or superintendent of gas, or combined gas and electric plants, in city of 15,000 to 25,000 population. Successful record. Southern or Middle States location preferred.

Address, "P. T. A.,"
16 8-1 Care this Journal.

WANTED,

Position as Superintendent of Gas Company,

By young married man of 16 years' experience in all its branches. Is now superintendent of gas company of 30,000,000 cubic feet. Will have to give present company 60 days' notice. Best of references.

1552-tf Address, "CAPABLE," care this Journal.

Position Wanted

As Water Gas Superintendent.

One that can get results wishes to change location. Highest references.

1065-4 Address, "A. C.," care this Journal.

Position Wanted

As Superintendent or Manager.

Gas engineer, with some electrical experience, desires connection with company operating gas or combined plants. At liberty June 1st. Address, "A. B.,"

1065-4 Care this Journal.

Situation Wanted

By First-Class Meter Repairer.

Twenty-two years' experience; 17 years with one gas company. References given.

Address, "BOX 137,"
1066-1 Care this Journal.

WANTED,

Position as Superintendent or Manager,

By practical commercial engineer with highly successful record of handling both gas and electric properties.

1606-3 Address, "A. F. J.," care this Journal.

Situation Wanted.

Young man, 29 years of age, wishes situation with gas company for main and service laying or pipe fitting on works. Capable of taking charge of men. Thirteen years' gas works experience. Good references. Address, "J. L.,"

1066-2 Care this Journal.

WANTED.

Retort House Man for Straight Coal Gas Works

Delivering under both high and low pressure. Must be familiar with Westinghouse compressors and pumps necessary in plant of this character. Two benches inclined 4's now working. Write for further information and terms. References required.

Address, CALUMET GAS COMPANY,
1067-tf LAURIUM, MICH.

WANTED,

Head Bookkeeper or Auditor.

A competent and experienced man with satisfactory references desired immediately by a gas and electric company in a progressive city of 200,000 population. Must be capable of reorganizing and maintaining office and accounting on up-to-date basis. Is position with good future for the right man.

Address, "L. J. E.,"
1065-tf Care this Journal.

WANTED AT ONCE,

Foreman of Fitting Department for Gas Company

In a town of 70,000 inhabitants in New York State. Address, giving references, stating experience and salary expected,

1067-2 Box 136, care this Journal

WANTED.

By gas company located in suburbs of New York city, a superintendent capable of taking charge of manufacturing, distribution and new business departments. State age, references and salary expected. None but first class man need apply.

1068 1 Address, "BOX A-1," care this Journal.

WANTED,

A Station Meter in Good Condition for Immediate Use.

Not less than 10 feet diameter.

1068-3 Address, "F. H. O.," care this Journal

FOR SALE,

One 4-foot Granger-Collins Water Gas Set.

WINSTED GAS COMPANY,
1065-7 STATION A, WINSTED, CONN.

50-CENT GAS.

I have a new continuous process for manufacture of producer gas, water gas, coal gas. The apparatus and process patented lately. Cost of plant and cost of manufacture lower than ever before known for equal service. Works satisfactorily in small or large units. Rights of territory for sale.

Address, W. H. ADAMS, Patentee,
1057-tf Box 209, Portland, Ore

UNUSUAL OPPORTUNITY.

RETIRING FROM BUSINESS.

Will sell my tray and planing mill business. Established for 25 years. Three months' work ahead. $35,000 invested.

JOHN CABOT.
1068-tf 1412 Adams St., Hoboken, N. J.

The Gas Engineer's Pocket-Book,

By HENRY O'CONNOR.

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works.

PRICE, $3.50.

For Sale by

A. M. CALLENDER & CO., 42 Pine Street, New York City.

SELF-INSTRUCTION

For Students in Gas Manufacture.

ELEMENTARY, ADVANCED AND CONSTRUCTIONAL.

Three Volumes. Price, $1.50 each. For Sale by

A. M. Callender & Co.,
42 Pine Street, New York City.

M. J. LOXLEY COMPANY,
BANKERS,
Land Title Building, Philadelphia, Pa.

GAS AND ELECTRIC PROPERTIES PURCHASED AND SOLD.

(Concluded from page 897.)

GAS METER CONNECTIONS.

H. Mueller Manufacturing Co., Decatur, Ills..... 898

GAS COCKS.

H. Mueller Manufacturing Co., Decatur, Ills..... 898

GAS GAUGES.

The Bristol Co., Waterbury, Conn..... 905

GAS GOVERNORS.

Chaplin-Fulton Mfg. Co., Pittsburgh, Pa..... 908
Connelly Iron Sponge & Governor Co., New York City. 903
Isbell-Porter Co., Newark, N. J..... 904
Pittsburg Meter Co., East Pittsburg, Pa..... 921
R. D. Wood & Co., Philadelphia, Pa..... 918
Reynolds Gas Regulator Co., Anderson, Ind..... 904

FUEL ECONOMIZERS.

Green Fuel Economizer Co., Matteawan, N. Y..... 905

CEMENTS.

C. L. Gerould, Pittsburgh, Pa..... 902

RETORTS AND FIREBRICKS.

Baltimore Retort and Firebrick Co., Baltimore, Md..... 902
Gas Bench Construction Co., St. Louis, Mo. 902
Henry Maurer & Son, New York City..... 905
James Gardner, Jr., Co., Pittsburgh, Pa..... 902
J. H. Gautier & Co., Jersey City, N. J..... 902
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 903
Missouri Firebrick Co., St. Louis, Mo 902
National Pyrogranit Co., New York City..... 902
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.... 901

INCLINED RETORTS.

Baltimore Retort and Firebrick Co., Baltimore, Md..... 902
Gas Bench Construction Co., St. Louis, Mo..... 902
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 903
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 901

VERTICAL S'S.

Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 903
Gas Bench Construction Co., St. Louis, Mo..... 902
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 903
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.. ... 901

REGENERATIVE FURNACES.

Baltimore Retort and Firebrick Co., Baltimore, Md..... 902
Bartlett, Hayward & Co.. Baltimore, Md..... 917
Gas Bench Construction Co., St. Louis, Mo..... 902
J. H. Gautier & Co., Jersey City, N. J..... 902
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 903
Missouri Firebrick Co., St. Louis, Mo..... 902
Parker-Russell Mining and Mfg. Co., St. Louis. Mo..... 901

SELF-SEALING MOUTHPIECE DOORS.

Continental Iron Works, Brooklyn, N. Y..... 918
Davis & Farnum Mfg. Co., Waltham, Mass..... 916
Isbell-Porter Co., Newark, N. J..... 904
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 917
Logan Iron Works, Brooklyn, N. Y..... 920
R. D. Wood & Co., Philadelphia, Pa..... 918
Stacey Mfg. Co., Cincinnati, O..... 919
The Gas Machinery Co., Cleveland, O..... 900
Western Gas Construction Co., Fort Wayne, Ind..... 924

INCANDESCENT GAS LAMPS.

General Gas Light Co., Kalamazoo, Mich..... 907
Geo. G. Ramsdell, New York City..... 902
Welsbach Company, Gloucester, N. J..... 910

BURNERS.

Wm. M. Crane Co., New York City..... 902

STREET LAMPS.

Thos. T. W. Miner, New York City..... 908
Welsbach Street Lighting Co., New York and Phila... 910

PURIFIERS.

Connelly Iron Sponge & Governor Co., New York City.. 913
Cruse-Kemper Co., Philadelphia, Pa..... 904
Davis & Farnum Mfg. Co., Waltham, Mass 916
Isbell-Porter Co., Newark, N. J..... 904
Kerr Murray Mfg Co., Fort Wayne, Ind..... 917
R. D. Wood & Co., Philadelphia, Pa..... 918
Stacey Mfg. Co., Cincinnati, O.. 919
Western Gas Construction Co., Fort Wayne, Ind. 924

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City.. 913

VALVES.

Continental Iron Works, Brooklyn, N. Y.. 918
Davis & Farnum Mfg. Co., Waltham, Mass..... 916
Economical Gas Apparatus Construc'n Co, Toronto, Ont 915
Isbell Porter Co., Newark, N. J..... 904
Kerr Murray Mfg. Co., Fort Wayne, Ind 917
Ludlow Valve Manufacturing Co., Troy, N. Y..... 905
R. D. Wood & Co., Philadelphia, Pa..... 918
Stacey Mfg. Co., Cincinnati, O..... 919
The P. H. & F. M. Roots Co., Connersville, Ind..... 907
Western Gas Construction Co., Fort Wayne, Ind..... 924

EXHAUSTERS.

Connelly Iron Sponge & Governor Co., New York City.. 913
Connersville Blower Co., Connersville, Ind..... 906
Davis & Farnum Mfg. Co., Waltham, Mass..... 916
Isbell-Porter Company, Newark, N. J..... 904
Kerr Murray Mfg. Co., Fort Wayne, Ind 917
The P. H. & F. M. Roots Co., Connersville, Ind. 907

PURIFIER AND SCRUBBER TRAYS.

Cabot Mfg. Co., Hoboken, N. J..... 915
Western Gas Construction Co., Fort Wayne, Ind..... 924

GAS STOVES.

American Meter Co., New York and Philadelphia..... 923
Keystone Meter Co., Boyerstord, Pa..... 921
Maryland Meter & Manufacturing Co., Baltimore, Md.. 922
Nathaniel Tufts Meter Co., Boston, Mass..... 922

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich..... 908

GASHOLDER TANKS.

J. P. Whittier, Brooklyn, N. Y..... 918

GASHOLDERS.

Bartlett, Hayward & Co., Baltimore, Md..... 917
Continental Iron Works, Brooklyn, N. Y..... 918
Cruse-Kemper Co., Philadelphia, Pa. 904
Davis & Farnum Mfg. Co., Waltham, Mass..... 916
Deily & Fowler, Philadelphia, Pa..... 920
Economical Gas Apparatus Construc'n Co., Toronto, Ont 915
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 917
Logan Iron Works, Brooklyn, N. Y..... 920
R. D. Wood & Co., Philadelphia, Pa..... 918
Riter-Conley Mfg Co , Pittsburgh, Pa..... 919
Stacey Mfg. Co., Cincinnati, O..... 919
Western Gas Construction Co., Fort Wayne, Ind..... 924

STORAGE TANKS.

Davis & Farnum Mfg. Co., Waltham, Mass..... 916
Stacey Mfg. Co., Cincinnati. O..... 919
Western Gas Construction Co., Fort Wayne, Ind..... 924

PAINTS.

American Standard Composition Co., New York City.. 916

PATENTS, TRADE-MARKS, COPYRIGHTS.

Royal E. Burnham, Washington, D. C..... 915

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

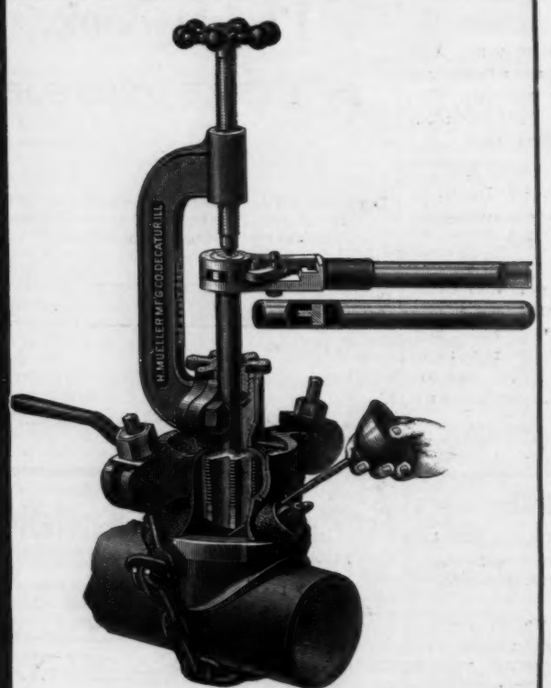
IMPROVED AMMONIA CONCENTRATOR.

About 100 in use. Write to

STROH & OSIUS, Patentees, or

MICHIGAN AMMONIA WORKS, • Detroit, Mich.

MUELLER SWIVEL NO. 2.



MAKES TAPS UP TO 3 INCHES.

A TALK ABOUT TAPPERS.

If you have no use for a tapping machine you don't need one. But if you have use for one you certainly need a MUELLER MACHINE.

BECAUSE

They are solidly built and do the work fast and clean cut.

They are superior—there is none better—none just as good.

They are given an actual working test before leaving the factory and we KNOW they are RIGHT.

They are made for making taps up to 4 inches.

They will do better everything that any other machine will do, and without giving you any trouble.

Consider these facts. It's to your interest.

Unconditionally Guaranteed.

A WORD ABOUT OLD MACHINES.

If your old machine needs attention send it in. We will make it practically as good as new at moderate cost.

H. MUELLER MFG. CO.

DECATUR, ILL. NEW YORK CITY.

OFFICERS:

E. C. BROWN,
President.

L. J. MONTGOMERY,
Sec'y and Treas.

B. H. SPANGENBERG,
Gen'l Mgr. and Eng'r.

SIDNEY A. REEVE, M.E.,
Consulting Eng'r.

Send for Catalog.

DIRECTORS:

E. C. BROWN,
IRA C. COPLEY,
HENRY L. DOHERTY,
THOMAS G. MARSH, M.E.,
GEO. D. ROPER,
Dr. F. SCHNIEWIND,
FREDERICK H. SHELTON.

EUROPEAN CONNECTIONS:

The Rotary Meter Co., (1905) Ltd.,
Manchester, England.

Compagnie pour la Fabrication des Compteurs et Materiel d'Usines á Gaz,
Paris, France.

The 4,000,000 Cubic Foot Per Day

ROTARY STATION METER

FOR THE

CONSOLIDATED GAS COMPANY OF NEW YORK.

Dimensions: Base 84 in.; Face to Face, Flanges 108 in.; Height 99½ in.; Connections 20 in.

The above illustration was made from a photograph taken at the Manchester works of our English company on the day (Aug. 11) this meter was shipped.

This ***Four Million*** foot Rotary Meter is about to be installed at the 21st Street station of the Consolidated Gas Company in the City of New York.

One-half the Cost—One-tenth the Space.

When in Need of Station Meters

write

ROTARY METER COMPANY,

280 Broadway,

NEW YORK.

P. PLANTINGA, President W. E. STEINWEDELL, Secretary

THE GAS MACHINERY CO.,

Main Office and Shops

CLEVELAND, OHIO.

NEW YORK OFFICE, 56 PINE STREET.

COAL AND WATER GAS APPARATUS,
EXHAUSTERS, CONDENSERS, SCRUBBERS,
TAR EXTRACTORS, WASHERS, PURIFIERS,
VALVES, CONNECTIONS,
BY PRODUCT MACHINERY,
COMPLETE GAS PLANTS.

PACIFIC COAST AGENTS: Hall die Machinery Co., Seattle, Wash.

ALL IRON OUTSIDE SCREW ANGLE VALVES.

THE GAS MACHINERY CO.
CLEVELAND, OHIO.

Parker-Russell Mining and Mfg. Co.,

ST. LOUIS, MO.

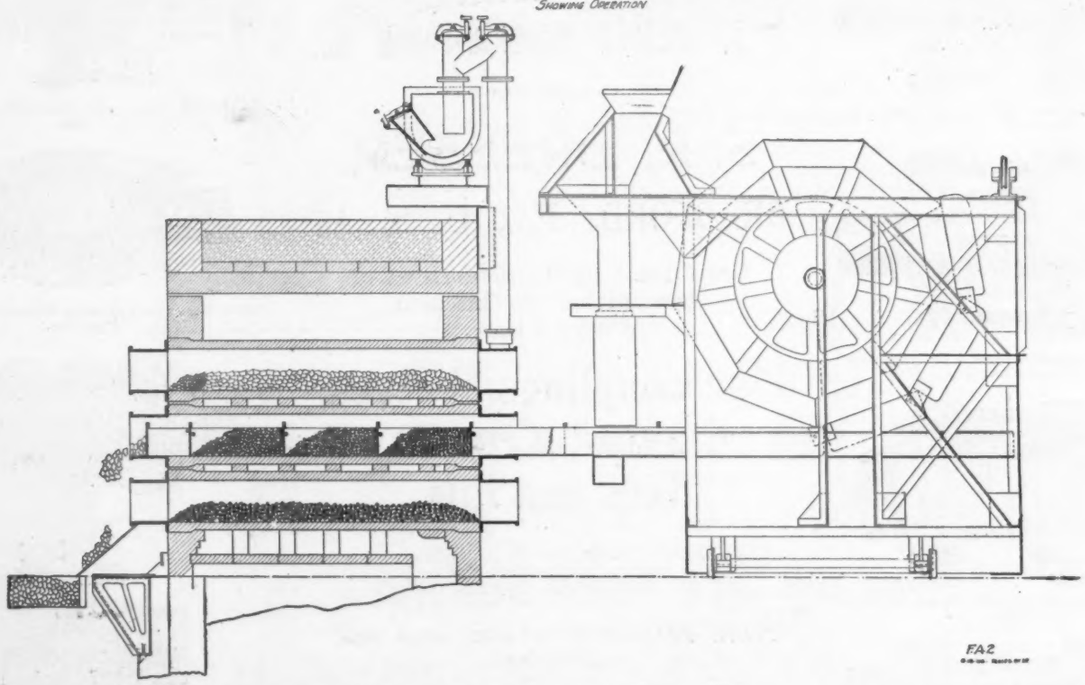
ST. LOUIS OFFICE: Suite 501-508 Liggett Bldg., 8th and Chestnut Sts.
NEW YORK OFFICE: 45 Broadway.

GAS RETORT BENCHES, STOKING MACHINERY, STAND-PIPE CLEANER and STRAIGHT STAND-PIPE SYSTEM.

GAS RETORTS AND FIREBRICK.

We Manufacture Gas Retorts and Settings, Furnace Blocks and Fireclay Tiles of every description.

FIDDES-ALDRIDGE SIMULTANEOUS RETORT DISCHARGING-CHARGER
SHOWING OPERATION



Benches.--We erect GAS RETORT BENCHES with Horizontal retorts having closed ends up to 10 feet in length, or Through retorts up to 20 feet in length.

Slopers.--Also, SLOPERS on improved lines for Inclined Retorts.

Stoking Machinery.--Sole Agents for U. S. and Canada for the Fiddes-Aldridge Simultaneous Discharging Charger. The "F. A.," or "One-Stroke" Machine. Cost of Carbonizing reduced to minimum. No Dust. Silent. No Waste of Coal. No Injury to Retorts.

Water Gas Linings.--We make a specialty of WATER GAS BLOCKS, and supply brick of superior grade for checkerwork.

Stand-Pipe Cleaner and Straight Stand-Pipe System.--Agents for the sale of the Stand-Pipe Cleaner and Straight Stand-Pipe System of the United Gas Improvement Company.

Retort Houses and Conveying Machinery.--We also build Retort Houses, Coal and Coke Conveying Machinery. Plans, specifications and estimates cheerfully furnished.

CORRESPONDENCE SOLICITED.

ALL CONTRACTS MADE, AS OF ST. LOUIS.

Bray's Universal.

THOSE WHO KNOW RECOMMEND BRAY BURNERS.

Take up most any publication devoted to Gas, read any book which deals with Gas, or look over the papers as read before the various Associations, and you will find that **BRAY BURNERS are always mentioned as the standard.** The leading experts recognize and always quote them as such.

Prof. VERNON HARCOURT, M.A., F.R.S. (Gas Referee to Board of Trade),

in a Lecture on "**IMPROVEMENTS IN GAS ILLUMINATION,**" before the Society of Arts, said the tables of tests which Mr. Harcourt had specially conducted to illustrate his lecture, showed that **BRAY'S FLAT-FLAME BURNER,** ungoverned, **yielded more light per cubic foot** of gas consumed than **any other Flat-flame Burner,** or cluster of Flat flame Burners, reported upon, and 6 per cent. more light than the Standard London Argand.

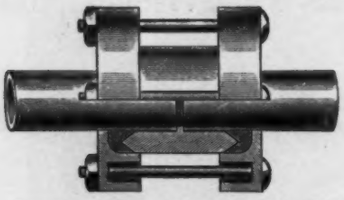
MAY WE SEND YOU OUR BLUE BOOK?

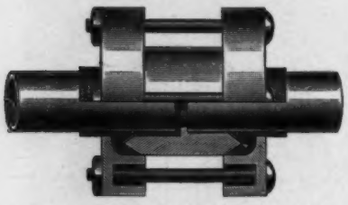
W. M. CRANE COMPANY,

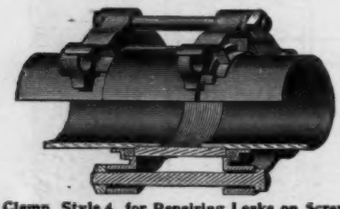
1131-33 Broadway, New York, N. Y.,

WE MAKE GAS APPLIANCES OF ALL KINDS. Sole Agents for Bray Burners for the United States and Canada.

Self-Lighting Burner.


Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.


Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe.


Clamp, Style 4, for Repairing Leaks on Screw Collar.

Long Sleeve, Style 2, for Mending Broken Lines.

S. R. DRESSER MANUFACTURING CO.,

SUCCESSORS TO

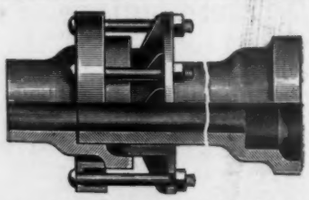
S. R. DRESSER,

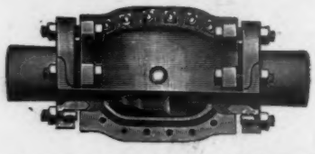
BRADFORD, PA., U. S. A.,

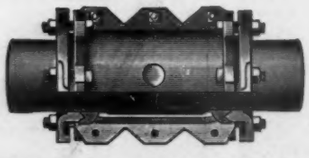
Patentee and Manufacturer of Specialties for Gas and Water Lines,

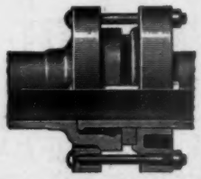
Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

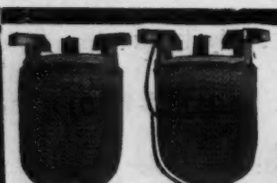
STATE REQUIREMENTS AND SEND FOR CATALOGUE.


Coupling, Style 9, for Special Style Cast Iron Pipe.


Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.


Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.


Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe.


No. 1 Plain
No. 1 Wired
For No. 1, 2, 4 and 5 Lamps.

Bijou.
Bijou Wired.
For No. 3 (Bijou) Lamp.

"Rico" Mantles.

Ramsdell

Our Mantles are the Standard Inverted Mantles, just as the RAMSDELL is the Standard Inverted Lamp. They are manufactured especially for the Ramsdell Lamps, being made of double woven Ramie and bearing our Trade Mark "RICO." Being made on our patented Mantle Ring, a firm hold is obtained on the porcelain cone, which prevents the mantle being jarred off the holder. This is an important feature of the "Rico" Mantles, and is one of the points which makes them the best mantles produced.

We have the exclusive control for the United States and Canada of the Farkas patents, covering the WIRE CAGED MANTLES such as are used abroad for Railway Car Lighting. This Mantle has been extensively used by us in the past two years on the Ramsdell Inverted Arcs and on other lamps where they are subjected to unusually severe requirements.

RAMSDELL INVERTED GAS LAMP CO., 530 Broadway, New York.

H. M. BYLLESBY & COMPANY

(INCORPORATED)

GAS ENGINEERS

DESIGN, CONSTRUCT AND OPERATE
COMPLETE COAL, WATER AND CRUDE OIL GAS PLANTS.

HIGH AND LOW PRESSURE DISTRIBUTING SYSTEMS.

EXAMINATIONS AND REPORTS.

AMERICAN TRUST BUILDING, - - - - - - - - - CHICAGO.

THE UNITED STATES.

PATENTED MAY 13, 1902.
"Self-Draining Meter."

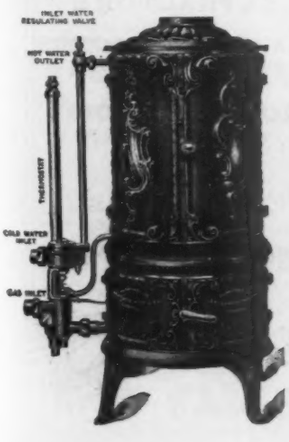
THE UNITED STATES
Self-Draining Meter.

NO DUMPING OF METERS TO GET THE WATER OUT.

Saves Over 75 Per Cent. in Cost Annual Repairs.

Prices low. Extra heavy tin used. Demonstrations at our expense. Send for circular.

THE UNITED STATES METER CO., { 229-269 Chestnut St., Brooklyn, N. Y.



Humphrey Auto-Thermal Pressure Water Heaters

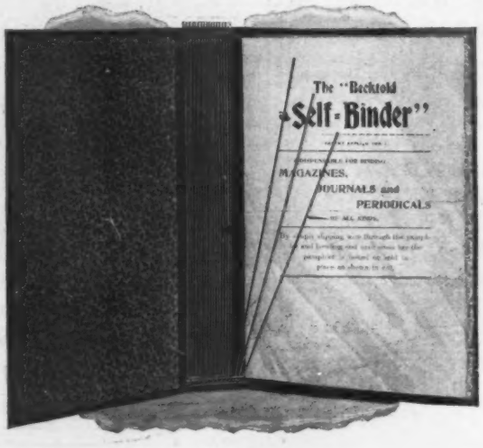
Are the Most Perfect of Any.

SOME EXCLUSIVE FEATURES.

1. The smallest pilot light in the world.
2. The only pilot light automatically controlled. Construction patented.
3. An external thermostat, the most sensitive and positive. It cannot be superheated by the pi ot light or hindered by lime. It insures safety, economy and reliability.
4. Multiple levers of thermostat all incased Cannot be disturbed.
5. Simplest Automatic Valve ev r made. Can't get out of order.

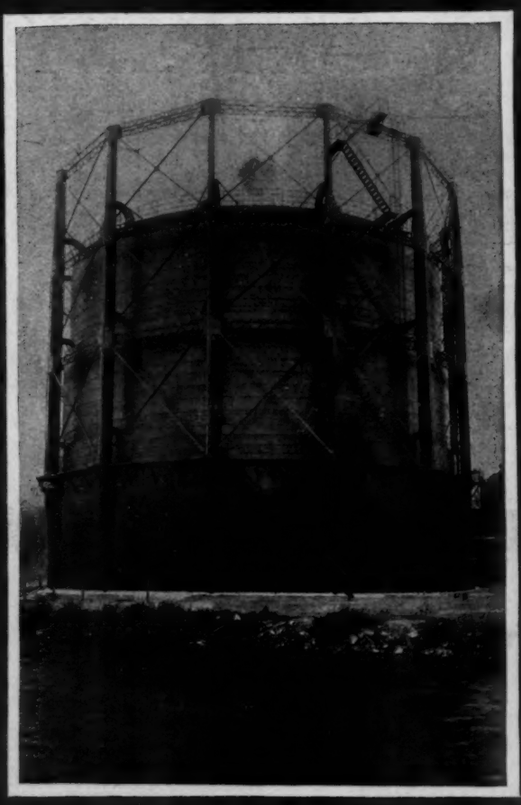
Shall we Send CATALOG No. 10 AND DISCOUNTS?

HUMPHREY CO., { Kalamazoo Mich., U. S. A.



Binder
FOR THE
Journal.
PRICE,
$1.

For Sale by
A. M CALLENDER & CO.,
42 Pine Street,
New York City.



ARTHUR R. CRUSE, PRESIDENT.
HENRY W. SCATTERGOOD, VICE PRESIDENT & TREASURER.
FRANK FLAVELL, SECRETARY.

CRUSE-KEMPER COMPANY

PHILADELPHIA OFFICES: SUITE 1124 LAND TITLE BUILDING.
WORKS: AMBLER PA.

Manufacturers of

TRIPLE
DOUBLE and
SINGLE-LIFT

Gas Holders

WITH OR WITHOUT
METAL TANKS

Oil and Water Tanks
Purifier Covers
General Plate Metal Work and
Steel Water Towers

PLANS, SPECIFICATIONS AND ESTIMATES
PROMPTLY FURNISHED ON REQUEST

J. S. DeHART, JR., PRESIDENT
A. F. WEHNER, SECRETARY
R. K. WEHNER, TREASURER

ISBELL-PORTER COMPANY

GAS ENGINEERS & BUILDERS OF GAS WORKS

BENCH WORK

CHARGING AND DISCHARGING MACHINERY

MACKENZIE EXHAUSTERS

PRIMARY AND SECONDARY CONDENSERS FOR FRESH OR SALT WATER

ISBELL VALVES SPECIALS

TAR EXTRACTORS

P.&A. TAR EXTRACTORS FOR WATER GAS

ROTARY AMMONIA SCRUBBERS

SHAVING SCRUBBERS PURIFIERS STREET GOVERNORS

MAIN OFFICE AND WORKS
BRIDGE & OGDEN STREETS
NEWARK, N.J.
ESTABLISHED 1865

THE

Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

Double and Single Gate Valves, ¼" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.

"HUNT" CABLE RAILWAY AT A GAS WORKS. One of our Methods of HANDLING and STORING COAL and COKE in Gas Plants.

Correspondence Invited.

C. W. HUNT CO., West New Brighton, N. Y. 45 Broadway, New York.

Bristol's Recording Pressure Gauges

—(ALL RANGES).—

Used the World Over.

Necessary Equipment

Write for Catalogue A.

For Every Gas Plant.

New York: 114 Liberty St.

Chicago: 753 Monadnock Bldg.

The Bristol Co., Waterbury, Conn., U S.A.

ARTHUR E. BOARDMAN, C.E.,

For several years associated with the late CAPTAIN WILLIAM HENRY WHITE,

WILL CONTINUE THE BUSINESS OF

CONSULTING ENGINEER

For Gas, Water and Electric Light Companies, at

No. 41 Wall Street, Room 1707, New York.

TELEPHONE, 5534 BROAD.

ESTABLISHED 1856.

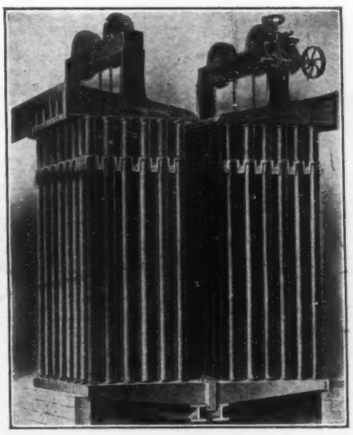
HENRY MAURER & SON,

Manufacturers of

High Grade Firebrick, Blocks, Tiles,

ETC.,

Works: Maurer, N. J. Office: 420 E. 23d St., N. Y. City.



HOW MUCH COAL PER 1,000 CU. FT. OF WATER GAS?

If the process of making water gas were theoretically perfect, only 24 lbs. of coal would be consumed per 1,000 cu. ft. of gas generated. As a matter of fact, the actual figures are between 40 and 48 lbs. per 1,000 cu. ft. It is apparent that there is a waste somewhere, and if you will take the trouble to put a thermometer over the stack valve during the "blowing up" period, you will see where the heat goes to. From one-third to one-half of the heat escapes to the atmosphere, either as sensible heat or latent heat of combustion. If use can be found for this heat a great economy could be effected immediately.

We have found such a use. By means of the Green Air Heater 12 per cent. to 15 per cent. of this heat, or more, can be imparted to the air blown to the generator. This will reduce the time for blowing up and increase the temperature of the generator, so that about the same proportion of coal will be saved.

After the gases have passed through the air heater they are still hot enough to use in a Green Fuel Economizer to heat the boiler-feed water up to the evaporative point. In In this way a quarter of the boiler coal can be saved. In connection with a 6-ft. generator an investment of $3,500 in an Air Heater and an Economizer will save from $2,300 to $2,500 per year. This ought to repay you for the trouble of writing us for further information. Ask for Circular "AG."

THE GREEN FUEL ECONOMIZER CO.

MATTEAWAN, N. Y.

(Sole builders of the Green Fuel Economizer in this country; we also build Fans and Blowers.)

Gas Analyst's Manual,

By JAQUES ABADY, M. Inst. Mech. E.

(Incorporating F. W. Hartley's "Gas Analyst's Manual" and "Gas Measurement.")

Ninety-three Illustrations and Nine Folding Plates.

Bound in Handsome Half Leather. Price, - $6.50.

FOR SALE BY

A. M. CALLENDER & CO., - - 42 Pine Street, New York City.

LLOYD'S SUBMERSION WASHERS.

Maximum Efficiency,
Minimum Back Pressure,
Complete Safety.

Western Sales Agent
BARTLETT, HAYWARD & CO., Baltimore, Md.

LLOYD CONSTRUCTION CO., Detroit, Mich.

WHY DO GAS EXHAUSTERS

AND HIGH PRESSURE GAS PUMPS BUILT BY

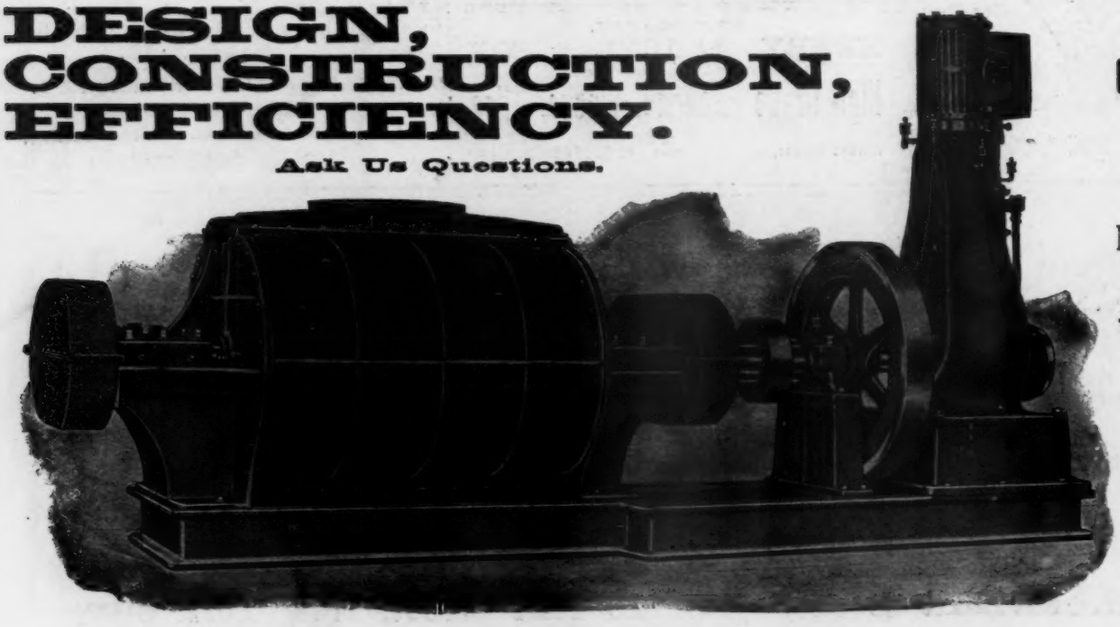
THE CONNERSVILLE BLOWER CO.

Stand so High in the estimation of those using them?

THE ANSWER IS IN THREE WORDS:

DESIGN, CONSTRUCTION, EFFICIENCY.

Ask Us Questions.



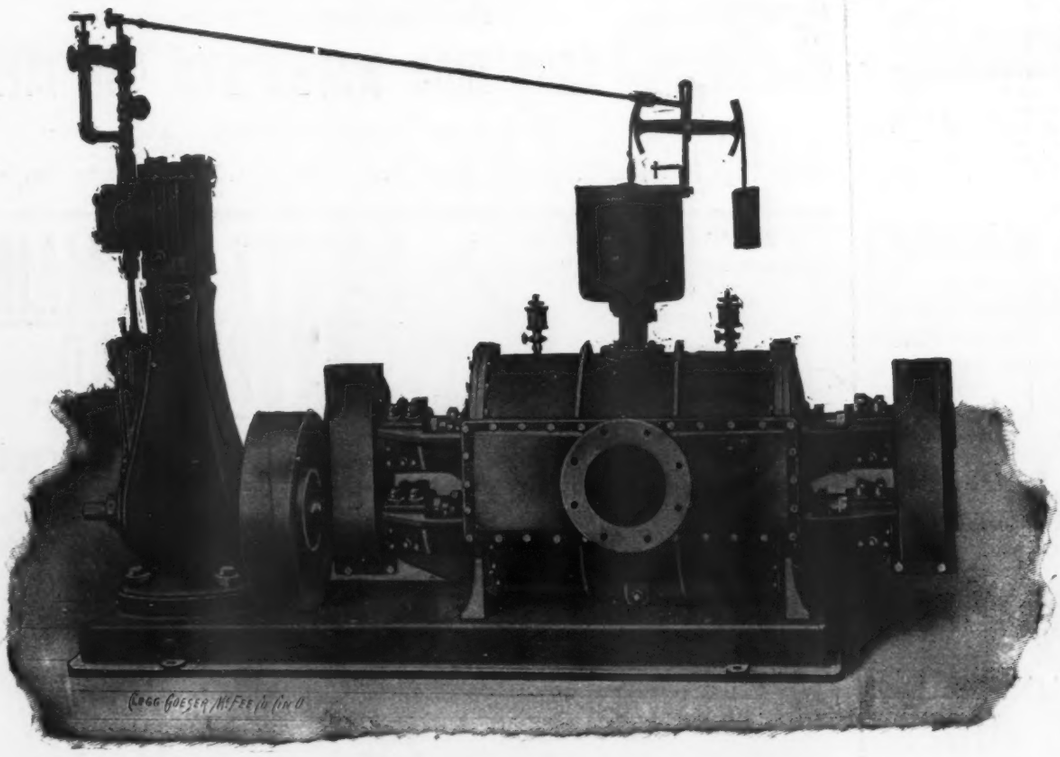
Home Office:
CONNERSVILLE, IND.

Eastern Sales Agent:
HORACE G. COOKE,
95 Liberty Street,
New York City.

Write us about our Improved Stuffing Boxes.

Something Entirely New.

ROOTS' GAS EXHAUSTERS.



Sizes for any required capacity.

Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

Write for Catalogue.

P. H. & F. M. ROOTS COMPANY,

HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
120-122 Liberty St.

CHICAGO OFFICE:
1547 Marquette Bldg.

Recent Shipments
of
HUMPHREY ARCS
have gone to

Honolulu,
Japan,
New Zealand,
Australia,
China,
India,

and all over Europe.

GENERAL GAS LIGHT CO.,
KALAMAZOO, MICH.

NEW YORK CITY:
46 West Broadway.

SAN FRANCISCO:
519 Eddy Street.

GEORGE ORMROD, Pres. & Treas. JOHN D. ORMROD, Supt
J. G. EBERLEIN, Secretary.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
DAYTON, O.

"THE MINER"

Globe Street and Boulevard Lamps.

Cheapest and Best

THOUSANDS IN USE WITH INCANDESCENT BURNERS.

Send for Catalogues.

THOMAS T. W. MINER,
821-823 Eagle Av., N.Y.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.

Plans prepared and Estimates furnished at short notice.

J. P. WHITTIER,
238 Java Street, Brooklyn, N. Y.

WARREN FOUNDRY AND MACHINE CO.,

Established 1856. Works at Phillipsburgh, N. J.

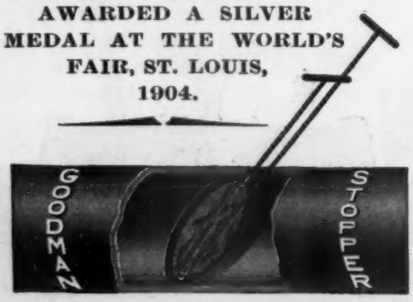
New York Office, 170 Broadway.

CAST IRON WATER AND GAS PIPE,

FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

AWARDED A SILVER MEDAL AT THE WORLD'S FAIR, ST. LOUIS, 1904.



SAFETY GAS MAIN STOPPER CO.,

257-263 East 133d Street,
NEW YORK CITY.

Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

JUL 25 1904 9 47 AM

The Follett Time Stamp

Can be Used for so Many Purposes it would Take a Book to Name them. . . .

Address,
A. ANDERSON, JR.,
247 W. 51st St.,
NEW YORK.

POOLE ON FUELS.

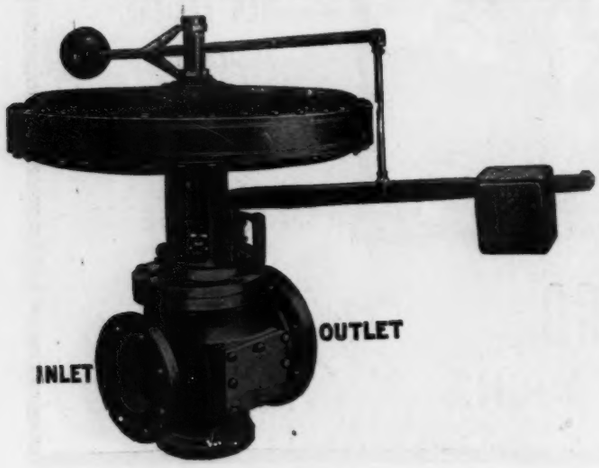
THE CALORIFIC POWER OF FUELS.

By HERMAN POOLE, F.C.S.

Second Edition. Price, $3. For Sale by

A. M. CALLENDER & CO., 42 PINE ST., N.Y. CITY.

STANDARD REDUCTION FACTORS for GASES,
By Helon Brooks MacFarland, B.S., M.M.E.
For Sale by
A. M. Callender & Co., 42 Pine St., New York City.



THE FULTON GAS PRESSURE GOVERNOR,

WITH AUTOMATIC SAFETY CUTOFF.

For Artificial or Natural Gas.
For District or Service Use.

Our DUPLEX SENSITIVE GOVERNOR, with Automatic Cutoff for district service, will reduce high pressure gas to inches of water without variation.

Absolutely safe and reliable. No complicated mechanism to get out of order. More than 20 years' experience with the largest gas companies.

SEND FOR LATEST CATALOG.

THE CHAPLIN-FULTON MFG. CO.,
28-30 PENN AVE., PITTSBURGH, PA.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

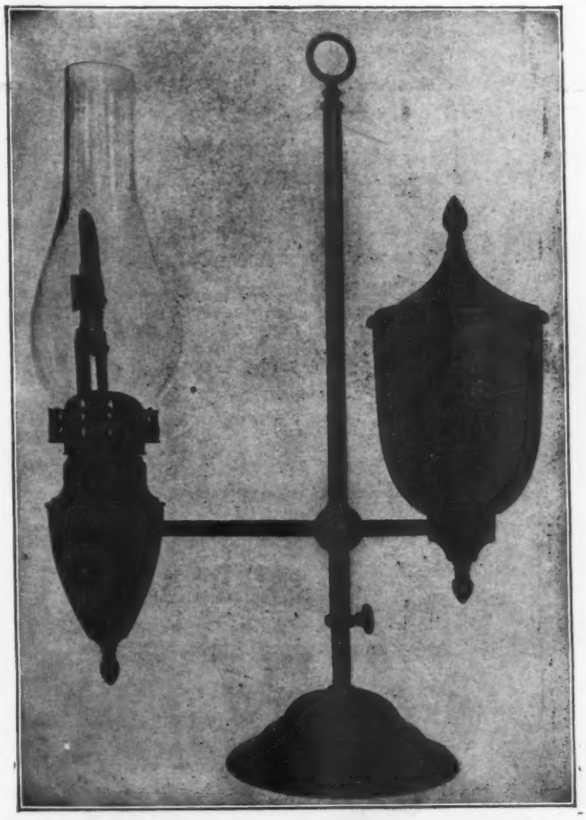
JUNE, 1907.

Day of Week.	Table No. 1. FOLLOWING THE MOON. Date.	Light.	Extinguish.
Sat.	1	7.50 PM	1.20 AM
Sun.	2	7.50 LQ	1.50
Mon.	3	7.50	2.20
Tue.	4	7.50	2.50
Wed.	5	7.50	3.20
Thu.	6	7.50	3.30
Fri.	7	7.50	3.30
Sat.	8	7.50	3.30
Sun	9	8.00	3.30
Mon.	10	8.00 NM	3.30
Tue.	11	8.00	3.30
Wed.	12	8.00	3.30
Thu.	13	8.00	3.30
Fri.	14	8.00	3.30
Sat.	15	10.00	3.30
Sun.	16	10.30	3.30
Mon.	17	11.00	3.30
Tue.	18	11.30 FQ	3.30
Wed.	19	12.00	3.30
Thu.	20	12.30 AM	3.30
Fri.	21	1.00	3.30
Sat.	22	1.40	3.30
Sun.	23	2.20	3.30
Mon.	24	No L.	No L.
Tue.	25	No L FM	No L.
Wed.	26	No L.	No L.
Thu.	27	8.00 PM	10.30 PM
Fri.	28	8.00	11.10
Sat.	29	8.00	11.50
Sun.	30	8.00	12.30 AM

TOTAL HOURS DURING 1907.

By Table No. 1.

	Hrs.Min.
January	211.10
February	193.40
March	182.10
April	167.00
May	157.00
June	145.30
July	151.50
August	162.30
September	175.30
October	202.40
November	209.30
December	231.50
Total, yr.	2190.20



THE ELLIOTT KEROSENE STANDARD PHOTOMETER LAMP.

❋❋❋

10-Candle Power.

❋❋❋

This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

JUNE, 1907.

Day of Week.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Date.	Light	Extinguish.
		P. M.	A. M.
Sat.	1	7.15	3.15
Sun.	2	7.15	3.15
Mon.	3	7.15	3.15
Tue.	4	7.25	3.15
Wed.	5	7.25	3.15
Thu.	6	7.25	3.15
Fri.	7	7.25	3.15
Sat.	8	7.25	3.15
Sun.	9	7.25	3.15
Mon.	10	7.25	3.15
Tue.	11	7.25	3.15
Wed.	12	7.25	3.15
Thu.	13	7.25	3.15
Fri.	14	7.25	3.15
Sat.	15	7.25	3.15
Sun.	16	7.25	3.15
Mon.	17	7.25	3.15
Tue.	18	7.30	3.15
Wed.	19	7.30	3.15
Thu.	20	7.30	3.15
Fri.	21	7.30	3.15
Sat.	22	7.30	3.15
Sun.	23	7.30	3.15
Mon.	24	7.30	3.15
Tue.	25	7.30	3.15
Wed.	26	7.30	3.15
Thu.	27	7.30	3.15
Fri.	28	7.30	3.15
Sat.	29	7.30	3.15
Sun.	30	7.30	3.15

TOTAL HOURS DURING 1907.

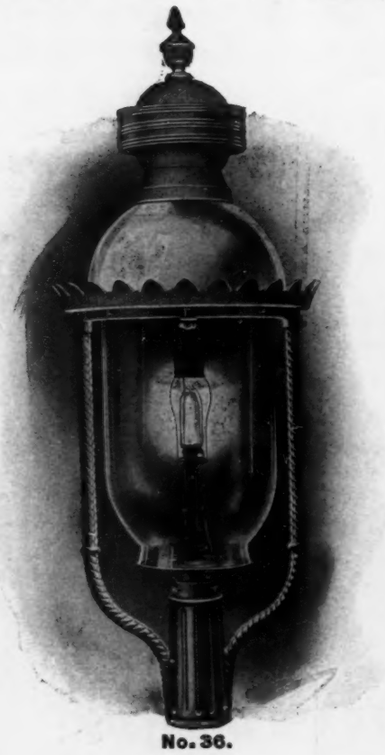
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
CHICAGO, 218 La Salle Street.
SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY

....OF AMERICA....



No. 36.

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

INVERTED REFLEX GAS LIGHT TRADE MARK

Succeeds and Excels the Electric Light at One-Quarter the Cost.

THE BURNER.

Elegance of Appearance.
Best Possible Material and Workmanship.
Perfect Combustion.
Lowest Gas Consumption.
Highest Candle Power.
Will Fit Any Fixture.
Will Not Flash Back.
Will Not Blacken Mantles.
Will Not Discolor Fixtures.
Will Not Discolor Ceilings.

THE MANTLE.

Best Welsbach Quality.
Extra Strong and Durable.
Highest Maintained Candle Power.
Rich Mellow Light.

THE GLASSWARE.

Highest Quality Imported.
Special Design Inner Cylinder (No. 317).
Protection from the Falling of Heated Particles.
Increases Candle Power.

Manufactured by

WELSBACH COMPANY.

FACTORIES:

Gloucester, N. J. Chicago, Ill.

Salesrooms in all leading cities of the United States.

WRITE FOR DISCOUNTS.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

LESSEES, OPERATORS AND BUILDERS OF GAS WORKS.

LARGEST BUILDERS OF

CARBURETTED WATER GAS PLANT IN THE WORLD.

SOLE BUILDERS OF THE Standard Double-Superheater Lowe Water Gas Apparatus.

1906 CONTRACTS.

PARTIAL LIST OF PLACES:

New Britain, Conn. (2d contract).
Malden, Mass. (3d contract).
Kirksville, Mo.
St. Johnsbury, Vt.
Memphis, Tenn. (2d contract).
Council Bluffs, Ia. (2d contract).
Seattle, Wash. (2d contract).
Philadelphia, Pa.
Waterbury, Conn.
Manchester, N. H.
Allentown, Pa.
Omaha, Neb.
Muskegon, Mich.
Nazareth, Pa. (2d contract).
Lewistown, Pa.
Greenville, Tex.
New York, Cent. Un. (3d contract).
Jefferson City, Mo.
Peekskill, N. Y. (2d contract).
Waterville, Me.
Washington, D. C. (4th contract).
Lawrence, Mass. (3d contract).
Hampton, Va.
Aurora, Ills. (2d contract).
Milwaukee, Wis.
Syracuse, N. Y. (2d contract).
Davenport, Ia.
S. Brooklyn, N. Y. (3d contract).
Delray, Mich.
Albert Lea, Minn. (2d contract).
Leominster, Mass. (2d contract).
Clinton, Mass.

TOTAL SETS INSTALLED IN 1906, ... 41
TOTAL SETS TO DATE, ... 634
TOTAL DAILY CAPACITY, ... 502,555,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
Straight Standpipe Cleaners.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

NATIONAL PYROGRANIT COMPANY,

MANUFACTURERS OF

Fire Brick, Tiles,
Special Shapes, etc.

NEW YORK OFFICE:
17 Battery Place, New York.

WORKS:
South River, N. J.

ESTABLISHED 1868.
L. N. RANCKE, Vice-Pres. & Mgr. F. SCHIAFFINO, Sec'y & Treas.

BALTIMORE RETORT & FIREBRICK CO.

BALTIMORE, MD.,

Manufacturers of all Material for the Construction of Coal Gas Benches.

HALF AND FULL DEPTH AND FREE FIRING BENCHES,

All styles of which we have in operation, equipped with the BEST of LATEST IMPROVEMENTS, proving our claim for SUPERIOR QUALITY and EFFICIENCY.

INCLINES—We have in SUCCESSFUL OPERATION benches of Inclined Retorts, MANUFACTURED and ERECTED by us.

WALDO BROS., 102 MILK ST., BOSTON, MASS.,
Agents for New England States.

LARGE FACILITIES—Correspondence Solicited.
RAIL and WATER CONNECTIONS to ALL POINTS.

ISAAC C. BAXTER, President. ESTABLISHED 1864. PETER YOUNG, Secretary and Treas.

Works,
LOCKPORT STATION, PA.

JAMES GARDNER, JR., CO.,

Successor to WILLIAM GARDNER & SON.

Address all communications to
JAMES GARDNER, JR., CO., Room 202 Lewis Bldg.
PITTSBURGH, PA.

Fire Clay Goods for Gas Works.

L. C. HAMLINK, President and General Manager. AUGUST COURT, Secretary and Treasurer.

GAS BENCH CONSTRUCTION CO.,

SUCCESSORS TO
ST. LOUIS GAS CONSTRUCTION CO.,
DESIGNERS AND BUILDERS OF

COAL GAS BENCHES,

"CHRISTY" HIGH GRADE REFRACTORY MATERIAL FOR BENCH SETTINGS, WATER GAS LININGS, ETC.

ST. LOUIS, MO.

GEROULD'S IMPROVED RETORT CEMENT.

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. PITTSBURGH, PA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD,
1200 Bank for Savings Bldg., Pittsburgh, Pa.

Modern Machine Shop Construction, Equipment and Management, by OSCAR E. PERRIGO, M.E.
Price, $5. For Sale by
A. M. CALLENDER & CO., 42 Pine St., New York City.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One to Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office:
411 Olive Street,
Continental Bank,
ST. LOUIS, MO.

12-inch High Pressure Governor.

REYNOLDS' GAS REGULATOR COMPANY,

ANDERSON, IND., U. S. A.

We make all sizes for all classes of reduction,

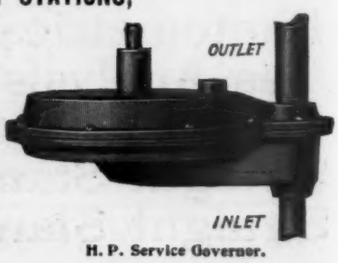
DOUBLE and SINGLE DISTRICT STATIONS,

And Individual Service Governors for Reducing High Pressure.

HOLDER GOVERNORS

And Low Pressure Regulators, all of the Dry Diaphragm type.

Write for Catalog.



H. P. Service Governor.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada, Detroit, Seattle, Rochester and St. Louis.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich., and Cincinnati, Ohio. These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

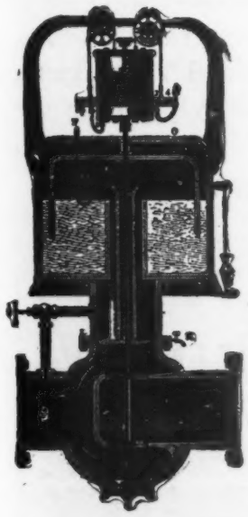
Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins. Coke Screening and Measuring Plants a Specialty.

G. A. BRONDER,

Contracting Engineer and Builder,

229 BROADWAY, NEW YORK.

CONNELLY IRON SPONGE AND GOVERNOR CO.,



Design, Construction and Extension of

COAL OR WATER GAS PLANTS,

Automatic, Balance, High Pressure and Service Governors,

Roots Improved Gas Exhausters,

Iron Sponge, Purifying Material, for Gas Purification, Jones Jet Photometers, Pressure Registers, etc.,

INSTALLATION OF SMOKELESS TAR BURNING SYSTEM.

Reinforced Concrete Construction for all Purposes,

Wide Experience in High Pressure Installation and Extension.

GAS SPECIALTIES.

395 Broadway, New York.

295 West 22d Street, Chicago, Ills.

For the 12 Months Ending December 31, 1906, the

LACLEDE FIREBRICK MANUFACTURING CO.

have been awarded contracts for complete new installations of coal gas benches of the free-firing, half depth, three-quarter depth and full depth types of fives, sixes and eights, at the following places:

WATERLOO, IA.	ORLANDO, FLA.	HATTIESBURG, MISS.	AUBURN, IND.
VALDOSTA, GA.	OWOSSO, MICH.	MARYSVILLE, O.	ROANOKE, VA.
BEDFORD, IND.	DURHAM, N. C.	CARTERSVILLE, GA.	ST. CLOUD, MINN.
BEATRICE, NEB.	FAIRFIELD, IA.		

and have been awarded contracts for lining complete water gas sets from 4 feet diameter to 11 feet diameter of the Lowe, Springer, and Loomis-Pettibone types, at the following places:

CHICAGO, ILLS.	COUNCIL BLUFFS, IA.	SIOUX FALLS, S. D.	MEMPHIS, TENN.
SAN ANTONIO, TEX.	CHICAGO HEIGHTS, ILL.	HOT SPRINGS, ARK.	KANSAS CITY, MO.
PORT WASHINGTON, WIS.	HOPKINSVILLE, KY.	BOONE, IA.	HUTCHINSON, KAS.
JEFFERSON CITY, MO.	ALBERT LEA, MINN.	AMARILLO, TEX.	DES MOINES, IA.
KOKOMO, IND.	GREENVILLE, TEX.	CUDAHY, WIS.	OMAHA, NEB.
		CRYSTAL CITY, MO.	

LACLEDE FIREBRICK MANUFACTURING COMPANY,

ST. LOUIS, MO.

Newbigging's Handbook for Gas Engineers and Managers. Price, $6.50. For Sale by A. M. Callender & Co., 42 Pine St., N. Y. City.

JAMES D. PERKINS, President. F. SEAVERNS, Treasurer.

THE PERKINS COMPANY,

228 and 229 Produce Exchange, New York City.

OCEAN MINE YOUGHIOGHENY GAS COAL,
OLD KENTUCKY SHALE AND O. K. BOGHEAD.

BERWIND-WHITE COAL MINING COMPANY'S

Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Betz Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming.

A. C. M. AZOY, General Agent, 1 Broadway, New York.

NAPHTHALENE SOLVENT.

Cheap and Efficient.

For Use in Works, Mains and Service Pipes. Shipped in 100-gallon Drums.

Semet-Solvay Co.,
Syracuse, N. Y.

JEFFREY
COAL HANDLING MACHINERY,
Installed for Cleveland Worsted Mills.

At Driving Point.

Send for Bulletins B and C,
ELEVATING,
CONVEYING,
CRUSHING
Catalogs.

Under Boiler Room.

The main conveyer buckets are filled by a special automatic loader. The crusher and short conveyer are driven by an independent engine.

The JEFFREY MANUFACTURING CO.,
COLUMBUS, OHIO, U. S. A.
New York. Pittsburgh. Knoxville. Denver. Chicago. Boston. Charleston, W. Va. Montreal, Can.

MAIN AND SERVICE LAYING.

Gas and water companies about to lay new mains or services will find it useful to communicate with us. Our gangs are experienced and our plant is completely equipped for street main and service laying in all branches. These are our specialties. We are in a position to quote prices which will attract the attention of the economical manager.

Gas Company References. Correspondence Solicited.

Telephone, 302 Flushing. SULLIVAN BROS., Flushing, N. Y.

ELECTRIC GAS LIGHTING.

How to install electric gas igniting apparatus, including the jump spark and multiple systems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

By H. S. NORRIE.

Price, 50 cents. Orders may be sent to
A. M. CALLENDER & CO., 42 PINE ST., N. Y. CITY.

GAS ANALYST'S MANUAL. By JAQUES ABADY. Price, $6.50. For Sale by A. M. Callender & Co., 42 Pine St., N. Y. City.

KELLER ADJUSTABLE COKE CRUSHER.

Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER,
Sec. & Supt. Gas Lt. & Coke Co.,
Columbus, Ind.
Correspondence Solicited.

THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,

Consulting Engineers.

Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::

PLANS,
SPECIFICATIONS
AND ESTIMATES
PREPARED.

AMERICAN OFFICE:
269 Front St., East, Toronto, Canada.

BAXTER & YOUNG,

CONTRACTING AND CONSULTING GAS ENGINEERS.

Examination and Values Ascertained of Artificial and Natural Gas Properties.

COMPLETE GAS WORKS ERECTED.

Artificial and Natural Gas Mains Furnished and Laid.

GAS PROPERTIES PURCHASED.

OFFICE: WAYNE COUNTY BANK BUILDING,
Rooms 201 & 202. DETROIT, MICH.

EDMUND H. McCULLOUGH, President. H. C. ADAMS, Vice-President. CHAS. F. GODSHALL, Treasurer. HENRY WHARTON, Secretary. C. B. NICHOLS, Assistant Secretary.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J.,
WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

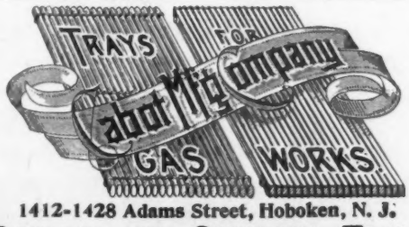
Principal Office, 224 South 3d St., Phila., Pa.

THE SUN OIL CO.

Gas Oil, Gas Naphtha,
Refined Oil, Lubricating Oils.

Toledo, O., and Pittsburg, Pa.

JOHN CABOT, President. GEO. D. CABOT, Secretary.



1412-1428 Adams Street, Hoboken, N. J.

PURIFIER AND SCRUBBER TRAYS
OF ALL KINDS.

Church's Patent Trays.

Reversible; Strongest; Most Easily Repaired.

Special Trays for Iron Oxide.

We also Supply the Cheapest and Strongest

Reversible Bolted Trays.

PATENTS, TRADE MARKS, COPYRIGHTS.

ROYAL E. BURNHAM,

Solicitor of Patents and Counsellor in Patent Causes.

833 Bond Building, Washington, D. C.

Send for Pamphlet on Patents.

Gas Engineer's Pocket-book, —BY— HENRY O'CONNOR

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works. PRICE, $3.50. For Sale by A. M. Callender & Co., 42 Pine St., New York City.

Standard Oil Company,

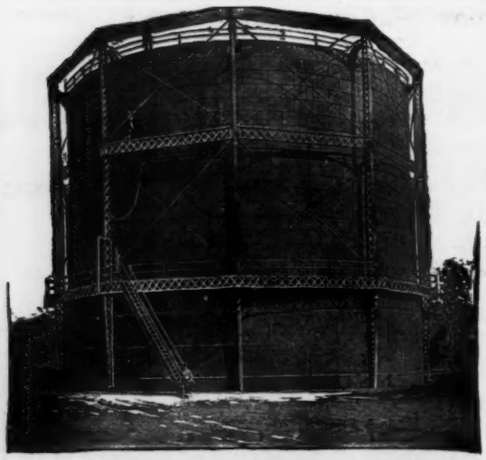
GAS NAPTHA DEPARTMENT.

GAS NAPTHA.

GAS OIL.

Correspondence Solicited.

26 Broadway, New York City.



DAVIS & FARNUM MFG. CO.,

Principal Office and Works, Waltham, Mass.

Single, Double and Triple-Lift Gasholders of any Capacity. Tubular, Pipe and Sinuous Friction Condensers of all Sizes.

Steel Tanks for Gasholders, Iron Roof Frames and Floors, Purifying Boxes, Center Seal or Valve Connections, Bench Work, Reversible Lime Trays.

Self-Sealing and Pressed Steel Mouthpiece Lids.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Works.

Also, Gas and Water Pipe, Flanged Pipe, Sugar House Work, and Special Castings of all Descriptions.

PRACTICAL GAS CONSTRUCTION COMPANY,

Office and Works at North Chicago, Ill.

CONSTRUCTION GAS ENGINEERS.

Standard Water Gas Apparatus. Practical Oil Gas Works and Machinery. Steel Tank and Cistern Holders--quick delivery up to 50,000 cu. ft. capacity. Dry Seal Steel Purifying Boxes.

OIL STORAGE, COMPRESSED GAS STORAGE AND BAFFLE TANKS.

New Gas Works installed complete, including all Generating Apparatus, Machinery, Buildings, Storage Tanks, Holders and STREET MAINS FOR HIGH OR LOW PRESSURE DISTRIBUTION SYSTEMS.

ENGINEERING SERVICES AND REPORTS BY ARRANGEMENT.

PLANS AND SPECIFICATIONS ON REQUEST.

THE AMERICAN STANDARD COMPOSITION CO.

MANUFACTURES

HEAT PROOF AND DAMP PROOF PAINTS

For Structural Iron and Steel, Gas Apparatus, Underground Piping, Boiler Fronts, Stacks, etc.

Our Paints will not crack, peel or scale. Heat does not affect them. They are moisture proof.

They are the Paints that Don't Come Off!

We let you Try before you Buy. Send for samples and prices.

AMERICAN STANDARD COMPOSITION COMPANY,

1707. Wall Street Exchange Building, New York.

QUINTARD IRON WORKS,

N. F. PALMER,

Foot of 12th St. & East River, New York,

MANUFACTURERS OF

GAS APPARATUS.

Complete Works Erected.

FREDERICK W. FLOYD, Engineer.

ALEX. C. HUMPHREYS, M.E., M. Inst. C.E. ARTHUR G. GLASGOW, M.E., M. Inst. C.E.

HUMPHREYS & GLASGOW,

CONSULTING ENGINEERS.

BANK OF COMMERCE BLDG., 31 Nassau Street, New York.

38 VICTORIA STREET, London, S. W., England.

ADVICE AS TO EXTENSION AND RECONSTRUCTION OF GAS AND ELECTRICITY PLANT.

COMPLETE EXAMINATIONS MADE.

PROPERTIES PURCHASED.

Bartlett, Hayward & Company,

Baltimore, Md. 100 Broadway, New York.

GASHOLDERS,

Coal and Water Gas Plants.

KERR MURRAY MANUFACTURING COMPANY,

Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS
AND STEEL TANKS,

Latest Improved

ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

Street Specials and Valves.

ADDRESS:

KERR MURRAY MANUFACTURING COMPANY, FORT WAYNE, IND.

R. D. WOOD & CO.,

400 CHESTNUT ST., PHILADELPHIA,

MANUFACTURERS OF

Cast Iron Pipe.

HEAVY LOAM CASTINGS,

Dunham Specials,

Hydraulic Work,

LAMP POSTS, VALVES, ETC.,

Gas Power Plants with Producers.

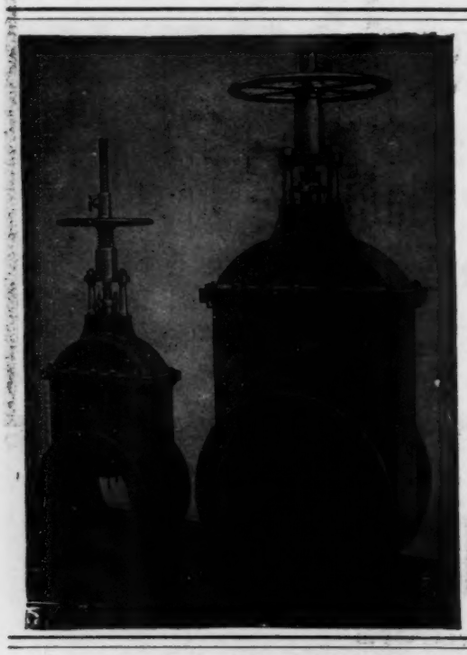
BUILDERS OF

Gasholders.

Single or Multiple Lifts, with or without Metal Tanks

PURIFIERS, CONDENSERS, SCRUBBERS, BENCH WORK.

Cutler's Patent Freezing Preventer for Holder Cups.



Double Gate Valves.

A LARGE STOCK ON HAND READY FOR PROMPT SHIPMENT.

These valves are provided with double discs or gates, and are tight with the gas pressure on either side of them.

The discs are so arranged as to be free from their seats when being opened or closed, and are operated by a quick-acting mechanism. The valve stem extends outside of the bonnet, and serves as an index, showing whether the valve is closed or open, and the amount of opening. They are made of the following dimensions:

Size.	8 Inches.	10 Inches.	12 Inches.	16 Inches.	20 Inches.	24 Inches	30 Inches.	36 Inches.
Diameter of flanges,...	13 inches.	16 inches.	18 inches	23½ inches.	27 inches.	3 inches.	37½ inches	44 inches.
Face to face of flange...	12 inches.	12 inches.	12 inches	14 inches.	17 inches.	20 inches.	21 inches.	23⅝ inches.

For price and other information, apply to

THE CONTINENTAL IRON WORKS,

NEW YORK (BOROUGH OF BROOKLYN).

P. O. STATION G.

FRANK D. MOSES,

Telephone, 1503-D Telephone, 1503-D

TRENTON, N. J.,

Constructing Engineer and Contractor.

Estimates Furnished on any kind of Work in Connection with Gas or Water Plants.

SPECIAL ATTENTION GIVEN TO THE REMODELLING AND EXTENDING OF THE PROPERTIES OF WORKS NOT UP-TO-DATE

CORRESPONDENCE SOLICITED.

1906 DIRECTORY 1906

OF AMERICAN GAS COMPANIES.

Price, - - - - - - - - $5.00.

A. M. CALLENDER & CO., 42 Pine Street, New York City.

THE STACEY MANUFACTURING COMPANY,

GAS WORKS BUILDERS,

CINCINNATI, OHIO.

GASHOLDERS.

RITER-CONLEY COMPANY,

GASHOLDERS, with or without Steel Tanks.

Purifiers, Condensers, Scrubbers, Oil Tanks, Smoke Stacks.

STEEL ROOFS and BUILDINGS.

PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

GENERAL OFFICE: Pittsburgh, Pa. EASTERN OFFICE: 111 Broadway, New York City.

WE DON'T CARE WHO MAKES YOUR METERS

If you use the Reeves slot attachments on them. Any good make of meter combined with the Reeves attachment makes the most perfect prepay meter ever manufactured.

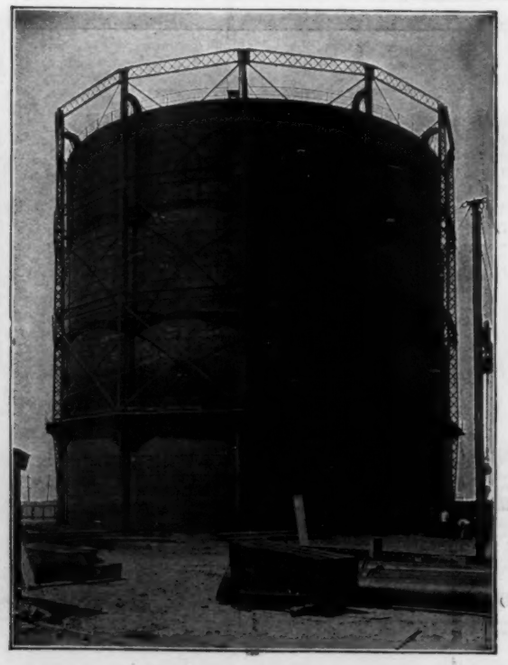
If your meter man does not handle the Reeves attachment we will supply you with the REEVES METER. Large capacity. Other important improvements. Unconditionally guaranteed.

REEVES MFG. CO., New Haven, Conn.

Newbigging's Handbook for Gas Engineers and Managers.

PRICE, $6.50.

A. M. CALLENDER & CO., 42 Pine Street, New York City.



Deily & Fowler,

39 Laurel Street, Philadelphia, Pa.

(ESTABLISHED 1842),

BUILDERS OF

GASHOLDERS,

Single-Lift or Telescopic,

With or Without Steel Tanks.

Oil Storage Tanks, Water Tanks, Etc.

ESTIMATES CHEERFULLY FURNISHED.

CORRESPONDENCE SOLICITED.

The order for this Triple-Lift Holder and Steel Tank was received by the Logan Iron Works from the Union Gas Light Company, of East New York. The contract was completed and the Holder was in actual use in 90 days from receipt of order. Capacity of Holder, 500,000 cu. ft.

LOGAN IRON WORKS,

Brooklyn, N. Y.,

MANUFACTURERS OF

Single or Multiple-Lift

GASHOLDERS,

Complete, with Steel Tanks.

BENCHES, SCRUBBERS,
CONDENSERS,
PURIFIERS, IRON ROOFS,
AND ALL PARTS OF
GAS WORKS APPARATUS.

Contractors for
Complete Works.

FREDERIC EGNER,
Gas Engineer,
NORFOLK, VA.,

May be consulted with reference to estimates of cost for new, or appraising actual value of existing works; utility of proposed or patented processes; relative earning power to capitalization, and management.

ELECTRIC GAS LIGHTING.

w to install electric gas igniting apparatus, including the jump spark and multiple vstems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

By H. S. NORRIE.

Price, 50 Cents. Orders may be sent to

D. M. CALLENDER & CO., - - - 42 PINE STREET, NEW YORK CITY.

Established 1854.

D. McDONALD & CO.,

MANUFACTURERS OF

WET AND DRY METERS, STATION METERS AND METER PROVERS.

ALSO MAKERS OF

THE GLOVER PREPAYMENT METER.

The amount of gas delivered for the coin can be instantly and positively changed without removing the meter or replacing any parts.

The gas registered agrees absolutely with the amount purchased by the coin.

WE HAVE MADE AND SOLD IN THE UNITED STATES

OVER 120,000 OF THESE METERS,

ALL OF WHICH ARE GIVING PERFECT SATISFACTION.

Correspondence Solicited.

561 West Forty-seventh Street, NEW YORK. | 51, 53 & 55 Lancaster Street, ALBANY, N. Y. | Jefferson and Monroe Streets, CHICAGO.

MORE THAN $30,000 WORTH

of

WESTINGHOUSE

LARGE CAPACITY METERS

have been purchased by a single gas company within the past year. Many other companies have also adopted them after a thorough investigation of their merits. Let us send you our catalogue and prices?

PITTSBURG METER CO.

EAST PITTSBURG, PA.

70 PER CENT.

Of Our Output is

PREPAYMENT GAS METERS.

We have fitted up over 16,000 Idle, Regular Meters with our

PREPAYMENT ATTACHMENT.

Can be attached to any make of meter.

NATHANIEL TUFTS METER COMPANY, 455 COMMERCIAL ST., BOSTON, MASS.

MARYLAND METER CO.,

BALTIMORE, North and Saratoga Streets. **CHICAGO, 1307 Railway Exchange.**

CONSUMERS' AND STATION METERS, PRESSURE GAUGES, ETC.

SPECIAL ATTENTION GIVEN TO ALL REPAIR WORK.

"Have you Seen our Complaint Meter?"

WHEN YOU SEND REPAIRS TO US

They can be changed to Prepayment, Prepayment and Beal Straight-reading, or Beal Straight-reading only. Good job. Good time. Good people. Write us.

KEYSTONE METER CO., Royersford, Pa.

EXTRA HEAVY TIN GAS METERS,

WITH

REINFORCED CONSTRUCTION, LARGER CAPACITY,

AND

THOROUGHLY SEASONED DIAPHRAGMS.

MEANS LOW MAINTENANCE COST. FIRST COST NO MORE.

PREPAYMENT METERS.

NEW YORK PREPAYMENT ATTACHMENT.

PRICES ON REQUEST.

NEW YORK IMPROVED METER CO., *306-310 East 47th St., New York City.*

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Wet and Dry Gas Meters, Station Meters, Meter Provers, Photometrical Apparatus, Gauges,

PREPAYMENT METERS,

REGULAR METERS REFITTED WITH PREPAYMENT ATTACHMENTS.

HELME & McILHENNY,

Established 1848. **1339 to 1349 Cherry Street, Philadelphia, Pa.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION. CORRESPONDENCE SOLICITED.

METRIC METAL COMPANY,

MAKERS OF

GAS METERS for NATURAL and ARTIFICIAL GAS.

Special Attention given to Repairing METERS of all Makes.

FACTORY AT ERIE, PA.

This is the best time to look after your repairing.

Seventy per cent. of old meters run slow. You are losing money on them. Let us put them in shape for you, a few at a time, until your entire meter equipment is made as good as new. It is better to attend to this matter now, before the Gas Stove season is at its height. Probably we can do such work in our factory better and cheaper than you can do it at home, and just now we can do it promptly.

The BUHL METERS are as good Meters as you can get.

DETROIT METER COMPANY, - - Detroit, Mich.

THE WESTERN

DUPLEX PURIFYING SYSTEM.

HIGHEST EFFICIENCY,
GREATEST CAPACITY,
LEAST FLOOR SPACE.

WRITE FOR PARTICULARS AND PRICES.

THE WESTERN GAS CONSTRUCTION CO.

FORT WAYNE, IND.

NEW YORK OFFICE—25 BROAD ST., ROOM 1909. SAN FRANCISCO OFFICE—600 SEVENTH ST.